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OCEANOGRAPHIC INSTRUMENTATION: AN ANNOTATED BIBLIOGRAPHY

SPECIAL BIBLIOGRAPHY
SB-62-19

APRIL 1962

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OCEANOGRAPHIC INSTRUMENTATION: AN ANNOTATED BIBLIOGRAPHY

Compiled by
E.E. GRAZIANO and A.A. BELTRAN

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APRIL 1962

Work performed in support of Lockheed Independent Research Program

Lockheed

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A GROUP DIVISION OF LOCKHEED AIRCRAFT CORPORATION

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ABSTRACT

This selective bibliography is the first supplement to Oceanographic Instrumentation: Salinity, Temperature and Sound Velocity Measurements. An Annotated Bibliography, compiled by A. A. Beltran, and published by Lockheed Missiles and Space Division as Special Research Bibliography SRB-60-7, September 1960 (AD-245-391). The scope of the supplement has been greatly enlarged so as to include all oceanographic instrumentation, equipment, and methods.

Sources consulted were:

Arctic Bibliography, v. 1-9, 1953-60.

Biological Abstracts, 1960-Mar. 1962

Bulletin Signaletique, Sect. IIB and VIII, 1961

Instruments Abstracts, 1960-1961.

Meteorological and Geoastrophysical Abstracts, v. 11-12, n. 10, 1960-1961.

Nuclear Science Abstracts, 1960 - Feb 1962.

Technical Abstract Bulletin, 1961 - 1 Mar 1962.

TABLE OF CONTENTS

1. Acoustical Society of America

Program of the Fifty-Ninth Meeting of the

Acoustical Society of America, Brown

University, Providence, Rhode Island.

J. ACOUST. SOC. AMER. v. 32, n. 7,

p. 912-942, July 1960.

Abstracts are given of papers presented at the meeting, including: Instrumentation for deep ocean acoustic research, L. F. Blickley; Resolution of underwater sound transducers in the near and far fields, C. M. McKinney.

2. Anderson, E. R. C

(Title possibly Classified) Navy Electronics

Lab., San Diego, Calif. NEL rept. no. 965,

2 May 60, 37p. ASTIA AD-322 726. CONFI-

DENTIAL REPORT

3. Arase, T.

TEMPERATURE MEASUREMENTS IN THE

OCEAN NEAR ELEUTHERA. Hudson Labs.,

Columbia Univ., Dobbs Ferry, N.Y.

Technical rept. no. 90, 15 Sep 60, 16p.

(Contract N6onr-27135 CU-113-60-ONR-271-

PHys.) ASTIA AD-250 930

Temperature records were obtained at depths of 130, 150, 170, 190, and 250 ft from five buoys initially separated from one another by six miles. Each record had a duration of about one day and records for three successive days were taken. These records were analyzed for autocorrelation and power spectrum. The power spectrum was in the frequency range from 0.5 to 12 cph. No lines were observed in the spectrum, showing that the temperature record cannot be synthesized by a linear combination of a few simple harmonic waves.

4. Aubell, A. C

SOME SEA CURRENT - AND DEPTH MEASUREMENTS (U). Norwegian Defence Research Establishment. Nov 60, 17p.

ASTIA AD-321 265. CONFIDENTIAL REPORT

5. Bang-bang controls guide sub simulator.

MACH. DESIGN v. 33, n. 14, p. 146-147.

6 July 1961.

A small torpedo-like device built by Clevite Corp., U.S.A., which behaves and sounds like a submarine for detection tests is described.

6. Barnes, H.

APPARATUS AND METHOD OF OCEANOGRAPHY. PART ONE: CHEMICAL.

New York, Interscience Publishers, Inc.

1959, 341p.

This is the first reference text and working handbook describing in detail methods for chemical oceanography, which are otherwise scattered throughout the literature. The book was sponsored by the Union Geodesique et Geophysique Internationale, and was critically reviewed in its entirety before publication by seven of the world's leading oceanographers; many others made contributions to various sections. It was designed for oceanographic, biological, and marine laboratories with limited library facilities. Sections deal with color comparitors and photometers, precision, calculation, chlorinity, pH, N, P, Si, C, 0_2, alkalinity, CO_2, the conservative elements, trace metals, plankton pigments, filtration, and sediments. The appendix contains 45 mathemetical, statistical, physical, chemical, and oceanographic tables.

7. Bascom, W.N.

INSTALLATION OF A WAVE RECORDER AT HECETA HEAD, OREGON. University of California at Berkeley. Fluid Mechanics

7. (cont'd) Lab. Tech. rept. no. HE-116-259, 19 May 47, 3p.

8. Bascom, W. N. INSTALLATION OF A WAVE RECORDER AT POINT SUR. University of California at Berkeley, Fluid Mechanics Lab. Tech. rept. no. HE-116-242, 15 Apr 57, 6p.

9. Bascom, W. N. INSTALLATION OF WAVE RECORDERS AT POINT ARGUELLO, CALIFORNIA. University of California at Berkeley, Fluid Mechanics Lab., Tech. rept. no. HE-116-291, July 48, 8p.

10. Baskakov, G. A. and Kudriavtsev, N. F. Autonomous stations for long-range observation on currents in the open sea. PROBLEMY ARKTIKI, SBORNIK STATEI v. 2, p. 93-96, 1957. (In Russian)

In 1956, the Arctic Institute's Kara Sea Expedition used 19 autonomous stations with 30 Alekseev automatic recorders, attached to anchored buoys for current observations. The stations were set at 15 points 25 to 75 miles from shore and 15 to 150 meters depth. The recorders were installed at 12 and 25 meters depth and cperated from two weeks to two months. Technical details of the setting up and recovery of the stations by the ice-breaker Litke and schooner Aktubinsk are described. The experiment was considered satisfactory though two stations were lost, and this method is to have wide use in the future.

11. Baskakov, G. A. and Kudriatsev, N. F. LONG SERVICE INDEPENDENT AUTOMATIC STATIONS FOR OBSERVATIONS OF CURRENTS IN THE OPEN SEA. (Dolgovremennye Avtonomnye Stantsii Nabliudenii nad Techeniiami v Otkrytom More). American Meteorological Society, Boston, Mass. Oct 59, 5p. (Contract AF 19 (604)6113) ASTIA AD-245 750 (Trans. no. T-R-253 of PROBLEMY ARKTIKI v. 2, p. 93-96, 1957.

Descriptors: Ocean currents*; Recording devices; Automatic; Buoys*.

12. Baylor, E. R. Infrared observation and cinematography of microcrustacea. LIMINOL. AND OCEANOGR. v. 4, n. 4, p. 498-499, 1959.

13. Bé, A. W. H., Ewing, M. and Linton, L. W. A quantitative multiple opening-and-closing plankton sampler for vertical towing. JOURN. CONSEIL. PERM. INTERNATL. EXPLOR. MER v. 25, n. 1, p. 36-46, 1959.

A quantitative, multiple plankton sampler is described which enables the sampling of plankton of 3 depth layers in a single, vertical haul. The device operates on the principle of opening-and-closing actions of 3 separate plankton nets. The nets are attached to 4 pivoting rods, having a common axis of rotation. At the start of the tow, the nets are folded to one side of the sampler frame. Messengers are used -- one at a time -- to activate each 90° rotation of the pivoting rods, thus enabling the opening-and-closing actions of the folded nets. At the end of the tow, the 3 nets are folded to the adjacent side of the frame. The rotation of the pivoting rods is accomplished by means of shock cords (elastic bands).

14. Beckman, W. C., Drake, C. L. and Worzel, J. L.
R/V Vema deep-sea winch. DEEP-SEA RESEARCH
(LONDON) v. 7, n. 1, p. 48-52, Aug 1960.

The recently redesigned heavy trawl winch used aboard the R. V. Vema of Lamont Geological Observatory (Columbia University) is described. During the lowering operation a Parkersburg Hydrotarder is used for braking. It provides a varying positive braking action function as a water brake which converts the mechanical energy into heat. For raising, a diesel engine drives the winch through a torque converter. This permits full utilization of the developed power of the engine, a method of exerting a fixed tension when pulling the apparatus out of the bottom, and eliminates the necessity of shifting gears and engine lugging (running over-loaded at slow speed) as with geared transmissions. With the new equipment, cable lowering speeds of 120 fathoms per minute and raising cable speeds of 50-70 fathoms per minute are possible.

15. Beckmann, W. C., Roberts, A. C. and Luskin, B.
Sub-bottom depth recorder. GEOPHYSICS
v. 24, n. 4, p. 749-60, Oct 1959.

The sub-bottom depth recorder (SDR) has been developed to study the underlying geologic structure of water covered areas. It is essentially a broad-band, high-powered echo sounder which utilizes one of two sound sources. The first, an electrical spark discharge (Sparker), has produced penetrations in excess of 600 feet in 50 feet of water. The second, a combustion chamber using a mixture of propane and oxygen (RASS), has produced penetrations in excess of 1400 feet in 80 feet of water. Results obtained from the SDR have been found to be in excellent agreement with test boring and seismic refraction data.

16. Beltran, A. A.
OCEANOGRAPHIC INSTRUMENTATION:
SALINITY, TEMPERATURE AND SOUND
VELOCITY MEASUREMENTS. AN ANNOTATED
BIBLIOGRAPHY. Lockheed Aircraft Corp.,
Sunnyvale, California. Special research bibliography no. SRB-60-7, Sep 60, 94p. ASTIA
AD-245 391

16. (cont'd) The annotated bibliography of 208 references is primarily concerned with electronic instruments for measurement of salinity, temperature and sound velocity in the deep ocean. Other equipment and instruments were included when their design or use was applicable to these measurements. For ease in locating items, the bibliography is divided into five categories: general oceanography; oceanographic equipment; sea water; underwater sound; and early Japanese literature. A subject index is included.

17. Benton, M. C

UNDERWATER SOUND. VOLUME 3. A BIBLIOGRAPHY OF CONTEMPORARY LITERATURE AVAILABLE 1959 - 1960 (U).

Naval Research Lab., Washington, D. C.

Rept. no. 9 on Surveys of Naval Science;

ONR survey no. ACR-58, Apr 61, 105p.

ASTIA AD-323 473. CONFIDENTIAL REPORT

Annotated references to unclassified and classified reports both foreign and domestic, issued for the most part during 1959 and 1960, on the subject of underwater acoustics and related topics.

18. Blouin, R. A., Sawyer, A. and Cornell, N. T. C

(Title possibly Classified) Portsmouth Naval Shipyard, N. H. Technical rept. no. SS(N)593-SO1 10 002, pt. 3, Nov 61, 177p. ASTIA AD-327 077.

CONFIDENTIAL REPORT

19. Boden, B. P., Kampa, E. M. and Snodgrass, J. M.

Underwater daylight measurements in the Bay of Biscay. MARINE BIOLOGICAL ASSOCIATION OF THE UNITED KINGDOM, JOURNAL v. 39,

19. (cont'd) n. 2, p. 227-38, June 1960.

A telerecording bathphotometer embodying a multiplier phototube is described and the circuitry is illustrated. Measurements were made of the penetration and spectral characteristics of daylight to a depth of 400 meters in the Bay of Biscay. It is suggested that the rapid attenuation of light in the upper 100 meters was due in part to biological matter associated with a sharp thermocline. A change of weather is presumed to have caused a change in the depth of the thermocline and this is reflected in a change in attenuation coefficients.

20. Bohan, W. A.

An instrument for absolute measurement of underwater sound velocity in situ. PROC. INSTRUM. SOC. AMER. v. 15, n. 1, Paper 26-NY60, 1960, 8p.

21. Bol'shakov, V. S.

Instruments for measurement of sea depth and collection of bottom samples. LENINGRAD. ARKTICHESKII NAUCHNO-ISSLEDOVATEL'SKII INSTITUT. POSOBIIA I RUKOVODSTVA v. 10, 36p, 1944. (In Russian)

Instruments and methods used under conditions of drifting and stationary ice cover are described; among them: Dobronravov's suspended device for measuring angularity of submerged anchor wire, Glushkov's bottom-sampler, Perfil'ev's stratometer for sampling silted and muddy bottoms 5 to 100 meters deep, sampling devices designed by Apolov (for 5 to 50 meters) and by Gomolunov for sandy, silty and gravel bottoms to 300 meters. Precautionary measures are mentioned in bottom sampling from drifting and stationary ice cover. A sample book for recording observed data is appended.

22. Borishanskii, L. A.

A method of continuous recording of sea-water salinity. PROBLEMY ARKTIKI n. 6, p. 39-46, 1959. (In Russian)

Description of a device for recording sea-water salinity used by the Sadko Expedition in Laptev Sea in 1937. Table shows specific resistance of sea-water of different concentration at various temperatures.

23. Brown, R. J.

Underwater instruments used for submarine pipeline engineering and construction. PROC. INSTRUM. SOC. AMER. v. 15, n. 1, Paper 18-NY60, 1960, 6p.

Brief descriptions are given of some instruments used.

24. Bruevich, S. V. and Demenchenok

Instructions for chemical analysis of sea water. LENINGRAD. ARKTICHESKII NAUCHNO-ISSLEDOVATEL'SKII INSTITUT. POSOBIIA I RUKOVODSTVA v. 7, 84p. 1944. (In Russian)

Various practical methods and equipment for collections, storage and analysis of sea-water samples at polar stations are described in detail. Micro-method of determination of salinity (chlorine) is adopted in preference to the More-Knudsen method. Practical reagents, equipment and formulas are outlined for different analyses. Determination of dissolved oxygen content, carbon dioxide, alkalinity and pH (hydrogen ion concentration) are described in separate chapters.

25. Bushor, W. E. and Wolff, M. F.

Electronics probes nature. ELECTRONICS

v. 33, n. 31, p. 55-86, 29 July 1960.

Reviews are presented of several topics including oceanographic measurements.

26. Campanella, A. J.

TELEMETERING THERMOMETER. Woods

Hole Oceanographic Institution, Mass.

Ref. no. 60-47, Dec 60, 8p. (Contract Nonr-

219600) ASTIA AD-248 694

A temperature transducer for temperature measurement at depth for a radio telemetering link from a drift buoy has been developed. The nominal design depth is 200 meters for the transducer. It has an accuracy of 0.1 degree C or better depending on radio link quality. The system is operational and is being tested at shallow depths.

27. Chaplygin, E. I.

New models of some oceanographic instruments.

PROBLEMY ARKTIKI v. 3, p. 106-8, 1958.

(In Russian)

Describes a modernized light bathometer, constructed by Ladoga Methodologic Station of the Arctic Institute, and a new type of plummet for measuring thickness of the ice in a hole bored by hand auger.

28. Chapman, P. O.

TEMPERATURE INSIDE AIDS TO NAVIGATION

LANTERNS. Coast Guard, Washington, D. C.

Proj. CGTD J24-2/1-1-15; Field Testing and

Development unit rept. no. 270, 5 Dec 61, 2p.

ASTIA AD-267 261

28. (cont'd) This analysis describes tests that determined the ambient temperatures inside various standard marine lanterns used on Coast Guard lighted buoys and minor shore lights. The effects of lantern colors, direct or indirect sunshine, and water or shore environment are reported. Temperatures up to 120 F. were reported inside the top of black lanterns.

29. Chernyshev, M. P.

Measurement of the direction and speed of sea currents from the shore. (Izmerenie napravleniia i skorosti morskikh techenii s berega.) METEOROLOGIIA I GIDROLOGIIA (MOSCOW) n. 6, p. 35-37, June 1960.

The various methods of visual measurement from shore of the currents in the Kerch Strait are described in detail and illustrated. The velocity and direction of the current are indicated by the angle and movement of the vertical floating "pole-buoy" chained to the anchor at a definite position on the bottom of the Straight. The velocity is computed with a special formula and the known characteristics of the "pole-buoy" determined in advance (weight and volume of float, distance from the anchor, density of water, etc.). The angle and movements of the "pole-buoy" are observed from the shore with graduated optical instruments. The measurements from the shore are compared with the values obtained with regular instruments. The accuracy varies with the velocity of current and is about 73% to 83%. The currents are also measured by a new floating "pole-buoy" device equipped with electric battery and bulbs, flashing each revolution of the submerged velocity indicator.

30. Chinn, A.

SUMMARY REPORT ON SHORE WAVE RECORDER MARK III. University of California at Berkeley, Fluid Mechanics Lab. Technical rept. no. HE-116-303, 1949, 25p.

31. Clark, J.R., Livingstone, R., Jr. and Crossen, J.M.
DEVELOPMENT AND OPERATION OF
TELEVISION FOR STUDYING FISH BEHAVIOR
IN OTTER TRAWLS. U.S. Fish and Wildlife
Serv. Special Sci. rept. Fish. 320, p. 1-21,
1959.

Underwater television equipment (Image Orthicon) used for studying the behavior of fish in otter trawls is described. Development of the equipment, including the television chain itself and the accessory power source, lights, etc., plus some methods of using the equipment are explained. Considerable attention is devoted to problems of operation, particularly to the difficulties in handling the camera cable. An extensive appendix gives in some detail the specifications of the television equipment used.

32. Coast Guard, Washington, D.C.
TESTS OF PARKER RING SEAL FOR
BUOY POCKETS. Rept. no. 242, Proj. no.
CGTD J24-2/1-2-6(c), 26 June 61, 10p.
ASTIA AD-258 893

Tests were conducted to determine the suitability of a Parker Ring Seal for use as a closure gasket in buoy pockets. The gasket assembly consists of an aluminum flat ring having a 24-inch I.D. and 30-1/2-inch O.D. with a neoprene rubber ring insert. The ring seal was installed in a mock-up buoy pocket and air tested to one atmosphere. Fire hose and water submergence tests were also performed. It was concluded that the Parker Ring Seal gasket was adequate for use in Coast Guard buoy pockets.

33. Colton, J.B., Jr.
The multiplane kite-otter as a depressor
for high-speed plankton samplers. JOUR.
CONSEIL PERM. INTERNATL. EXPLOR. MER
v. 25, n. 1, p. 29-35, 1959.

The multiplane kite-otter as a depressor is described. Depth and wire profile calculations for a 60 pound multiplane and 1/4 inch and 1/2 inch towing wire at speeds of 5,

33. (cont'd) 7, and 10 knots are presented. The diving and stability characteristics of the multiplane are discussed. Through the use of the multiplane kite-otter, it is possible to sample at high speed and at specific depths down to 150 m or more.

34. Daugherty, J. F.

THEORY, DESIGN AND CALIBRATION OF A NEW ULTRASONIC DENSITOMETER. Naval Ordnance Lab., White Oak, Md. NAVWEPS rept. n. 7399, 6 Mar 61, 51p. ASTIA AD-258 674

A new type of densitometer was constructed and is being assembled and calibrated. The measurement of the specific volume of liquids as a function of temperature and pressure utilizing ultrasonic techniques of sound speed measurement are discussed. Sound speed was measured to an accuracy of one part in 7,000 in water as a function of temperature, pressure, and salinity over nominal temperature and pressure ranges of 0 to 100 C and 14.7 to 15,000 psia, respectively. An analysis of the densitometer indicates an expected accuracy in specific volume measurements near one part in 10,000 over these same ranges of temperature and pressure. The general methods of calibrating this instrument are also reported

35. Deacon, G. E. R.

Deep-current measurements. IN PROCEEDINGS OF THE UNESCO SYMPOSIUM ON PHYSICAL OCEANOGRAPHY, TOKYO p. 20, 1955.

Ocean water movements can now be determined by using neutrally buoyant floats into which transmitters have been fitted. The floats are made to float at predetermined depths by properly adjusting their weight in relation to their volume and compressibility.

36. Della Croce, N. and Sertorio, T.

Microdistribution of zooplankton. (Micro-distribuzione dello zooplancton.) BOLL. MUS. IST. BIOL. v. 29, n. 175/176, 1959. 1959.

36. (cont'd) Three series of planktonic samples have been collected in the Ligurian Sea to attempt to learn about the microdistribution in the first meter of the surface layer. Ten Hensen nets were placed one below the other by affixing them to a steel pole attached to the bow itself. The nets presumably towed in each successive 10 cm layer between the surface and 100 cm. The quantitative variations of the planktonic population at different microlayers mainly concerned copepods; the other organisms showed a more uniform distribution in each microlayer. The pattern of distribution from the statistic viewpoint showed that organisms could be bunched or randomly distributed. The most interesting feature was then an increase in superficial microlayers and a decrease in the deeper ones or vice versa took place after that a species decreased the density of its population at microlayers three-five. The quantitative variations of bacteria and dinoflagellata in Californian and Norwegian waters showed such a critical level in the same surface layer. This situation suggested that some ecological factors played a main role on microdistribution of planktonic organisms.

37. Diomidov, M. N. and Dmitriev, A. N.

SOUNDING THE DEEP (Pokorenie Glubin).

Leningrad. Gos, Soiuznoe Izd-vo Sudostroit.

Promyshl. 1959, 175p. (In Russian)

A popular account of methods of exploring the sea and of sounding (by means of bathometers, bathyscaphes, dredges, hydrostats, etc.), photography, study or analysis, etc., and the results of these explorations and studies, their economic importance (e.g., for fisheries), etc. Equipment is described in detail and illustrated. Expeditions and equipment in use in the U. S. S. R. are emphasized.

38. Dow, W.

A telemetering hydrophone. DEEP-SEA

RES. v. 7, n. 2, p. 142-147, 1960.

This report describes a deep, telemetering hydrophone which transmits its information acoustically through the water to a surface vessel. The instrument has the advantage of requiring no electrical cable to the ship and, being self-contained, may be quickly hung on any suitable supporting line or wire. Alternatively, any type of inexpensive single-conductor cable of sufficient strength, such as oil-well logging cable, may be used to replace the acoustic link for some purposes if desired.

38A. Duckworth, J. W., et al

SEA WATER RADIOLOGICAL MONITORING METHODS. Naval Medical Research Inst., Bethesda, Md. 17 Dec 58, 54p.

The dispersal in time and sea of radioactive contamination produced by a deep underwater atomic blast was studied. Instrumentation methods obtained radiation intensity vs. depth information for several surface locations, and continuously monitored a sea-water intake line aboard ship. Surface contamination measurements were also made.

39. Dulberger, L.

Deep-ocean velocimeter aids sonar systems design. ELECTRONICS v. 34, n. 22, p. 41-43, 2 June 1961.

Instruments commercially available in the U. S. A. for the measurement of sound in water was described.

40. Duncan, J. K.

A SELECTIVE BIBLIOGRAPHY OF THE ENVIRONMENTAL CONTROLS ON OBJECT STABILITY ON THE SEA BOTTOM. Hydrographic Office, Washington, D. C. Special publication no. 32, Sep 60, 121p. ASTIA AD-247 912

A survey is made of the published literature that deals with the environmental controls of objects placed on the sea bottom. It constitutes the first phase of a comprehensive study directed toward the development of a means of predicting the stability and behavior of bottom submarine installations.

Duntley, S. Q.

MEASUREMENTS OF THE TRANSMISSION

OF LIGHT FROM AN UNDERWATER POINT

SOURCE. La Jolla, California. Rept. no.

5-11, Oct 60, 21p. (Contract NObs-72039)

ASTIA AD-251 744

Underwater measurements of the transmission of light from a submerged uniform point source are described and compared with the predictions of certain simple equations. Although the data relate only to a single example of natural water they conform with certain general principles, so that applicability of the results to most natural waters is probably.

42. Duntley, S. Q.

MEASUREMENTS OF THE TRANSMISSION

OF LIGHT FROM AN UNDERWATER SOURCE

HAVING VARIABLE BEAM-SPREAD. Visibility

Lab., University of California, San Diego.

SIO ref. no. 60-57, Nov 60, 14p. (Contract

NObs-72092) ASTIA AD-251 829

Underwater measurements of the transmission of light from a submerged source of variable beamspread are described. Angular beam-widths down to 20 deg were used. It was found that the irradiance due to sources producing uniform circular light beams of total plane angular width when theta equals or is greater than 20 degrees can be represented by an equation. An important implication of the equation is that, from the standpoint of efficiency, underwater lighting systems should employ narrow-beam sources to the maximum extent practicable, even at ranges so great that the monopath transmission is negligible.

43. DuPre, E. F. and Dawson, L. H.

TRANSMISSION OF LIGHT IN WATER: AN

ANNOTATED BIBLIOGRAPHY. Naval Research

Lab., Washington, D. C. NRL bibliography no. 20,

43. (cont'd) Apr 61, 79p. ASTIA AD-256 765

This bibliography on the transmission of light and related optical properties of water records information published throughout the world and covers a period of 141 years, 1818-1959. Most of the entries are annotated with special attention to those on light transmission. Water, as used above, includes pure distilled water, lake water, and seawater. Early papers, mainly of Swiss, German, French, and Italian origin, indicate the initial interest in the color of natural waters with subjective conclusions until Secchi in 1865 resolved to settle some of the questions with direct experiments on seawater. The history of progress of the study of light in water, closely follows advances in photometric instrumentation. Entries on the subject from the various countries reflect their particular interest in the sea. This represents the contributions to hydrooptics of over 400 authors from over 150 periodicals and other sources. Arrangement is alphabetical by first author named. An author index, which includes co-authors, a subject index, and geographical index are included.

44. Dyk, I. and Swainson, O. W.

The velocity and ray paths of sound

waves in deep sea water. GEOPHYSICS

v. 18, n. 1, p. 75-103, Jan 1953.

Time-distance, frequency, and amplitude measurements were obtained in deep sea and shallow waters off the coast of California. The mean velocity from a depth of 30 to about 1000 fathoms agreed with predictions within a few meters per second.

45. Edgerton, H. E.

Use of sonar in oceanography. ELECTRONICS

v. 33, n. 26, p. 93-95, 24 June 1960.

46. Edgerton, H. E. and Raymond, S. O.

Instrumentation for exploring the ocean.

ELECTRONICS v. 33, n. 15, p. 62-63,

8 Apr 1960.

An underwater camera system is described.

47. Edwards, R. W. and Brown, M. W.
An aerial photographic method for studying the distribution of aquatic macrophytes in shallow water. JOURN. ECOL. v. 48, n. 1, p. 160-162, 1960.

A method of photographing the distribution of macrophytes in shallow bodies of water is described. The apparatus consists of an electrically operated and stabilized camera suspended from a polyethylene balloon filled with hydrogen.

48. Ellsworth, W. M.
GENERAL DESIGN CRITERIA FOR CABLE-TOWED BODY SYSTEMS USING FAIRED AND UNFAIRED CABLE. Pneumodynamics Corp., Bethesda, Md. Rept. no. TN-SEDU-6634-1, Oct 60, 59p. (Contract Nonr-320100)
ASTIA AD-252 870

A method for rapid selection of design parameters to satisfy requirements for cable-towed instrument systems is described. The method is applied to both faired and unfaired cable systems. Curves are presented which facilitate the determination of cable diameter, cable length, and required down force without the need for performing laborious cable calculations previously required.

49. Ellsworth, W. M. and Gay, S. M.
PRELIMINARY DESIGN OF A CABLE-TOWED OCEANOGRAPHIC INSTRUMENTATION SYSTEM. Pneumodynamics Corp., Bethesda, Md. Rept. no. TN-SEDU-6634-2, Feb 61, 94p. (Contract Nonr-320100) ASTIA AD-252 872

A cable-towed instrumentation system, capable of measuring and continuously recording data from oceanic depths as great as 5000 feet is described. General system design is

49. (cont'd) outlined, with particular attention paid to contrasting requirements for faired- and unfaired-cable systems. The hydromechanical design for a depressor is included, as well as the detailed arrangements for a typical temperature-recording system.

50. Esteves Cardoso, J. C. and Caldeira Saraiva, C. R.
Note on design of research stern fishing
trawler. ROYAL INSTITUTION OF NAVAL
ARCHITECTS, QUARTERLY TRANSACTIONS
(LONDON) (Formerly Institution of Naval
Architects, Translations) v. 102, n. 1,
p. 1-11, Jan 1960.

Presents a description of the type of vessel now used in Portugal and the bases for new design, which will use 900 bhp diesel propulsion and diesel auxiliaries; the latter is to be essentially a fisheries research vessel, chiefly for exploratory surveys and experimental fishing which could be carried out while trawling on industrial scale. The plans of both ships are included.

51. Ewing, J. and Ewing, M.
A telemetering ocean-bottom seismograph.
JOURNAL OF GEOPHYSICAL RESEARCH
v. 66, n. 11, p. 3863-78, Nov 1961.

Successful tests of a telemetering ocean-bottom seismograph have been made on three occasions. In all cases, the seismograph was resting on the ocean bottom or planted in the sediments, sending its information to the surface by frequency modulation of a supersonic beam.

52. Ewing, M., Gerard, R. D. and Langseth, M.
THERMOGRAD MEASUREMENTS IN WATER
AND SEDIMENTS OF THE DEEP SEA.
Columbia University, Palisades, New York,
Lamont Geological Observatory. Rept. no.

52. (cont'd) NYO-2922, 1 Sep 59, 42p.

An instrument has been developed for measuring thermal gradients in ocean bottom sediments. Penetration to 10 m or more is usually possible. Water temperature is recorded continuously during lowering and raising of the instrument.

53. Fiber-glass instrument carrier built for underwater research. ELECTRON. DESIGN v. 9, n. 15, p. 35, 19 July 1961.

Brief details are given of a submarine instrument carrier called the V-Fin developed by Braincon Corp., U. S. A.

54. Filloux, J. and Groves, G.
A seasonal mean sea-level indicator.
DEEP-SEA RESEARCH (LONDON) v. 7, n. 1, p. 52-61, Aug 1960.

By means of oil capillaries the indicator attenuates the tidal rise and fall of the sea surface, as well as all fluctuations of higher frequencies. The time constant of the response is chosen so that the smaller, slower fluctuation of sea level is transmitted with very little change of amplitude and phase. There is no recorder. Visual readings of the oil level in a burette should be tabulated twice a week. Installation of the instrument is much easier and cheaper than a recording tide gauge.

55. Finucane, J. H. and May, B. Z.
Modified Van Dorn water sampler.
LIMNOL. AND OCEANOGR. v. 6, n. 1, p. 85-87, 1961.

56. Fish, G. R.

Electronic control systems used on hydrographic surveys. J. GEOPHYS. RES. v. 65, n. 2, p. 499-505, Feb 1960.

The three systems described were used to measure distance and provide position control on the U. S. S. Hydrographer during a survey of Georges Bank off the Massachusetts coast.

57. Fofonoff, N. P. and Froese, C.

Programs for oceanographic computations and data processing on the electronic digital computer ALWAC III-E, M-1 miscellaneous programs. CANADA. FISHERIES RESEARCH BOARD MANUSCRIPT REPORT SERIES (OCEANOGRAPHIC AND LIMNOLOGICAL) n. 72, 35p, 17 June 60.

On t-p: Programmed by the Canadian Committee on Oceanography. This publication describes a variety of programs written for the automatic computer, ALWAD III-E, at the University of British Columbia. The programs are entitled: (1) Salinometer tables, (2) Classification of daily seawater data, (3) Tide Program, (4) Program for stability and potential energy parameters and (5) Mass transport from atmospheric pressure data.

58. Folsom, R. G.

DAMPING DISC TESTS IN SAN FRANCISCO BAY. University of California at Berkeley, Fluid Mechanics Lab. Technical rept. no. HE-116-38, 8 Dec 44, 5p.

59. Folsom, R. G.

FIELD TEST OF SHORE WAVE RECORDERS. University of California at Berkeley, Fluid Mechanics Lab. Technical rept. no. HE-116-180, 23 Nov 45, 28p.

60. Folsom, R. G.

MEASUREMENT OF OCEAN WAVES. University of California at Berkeley, Fluid Mechanics Lab. Technical rept. no. HE-116-282, 15 May 48, 9p. (Also In AMERICAN GEOPHYSICAL UNION TRANSACTIONS v. 30, n. 5, p. 691-99, Oct 1949.)

Laboratory and field investigations demonstrate that theoretical pressure ratios for pressure wave recorders are correct to within 10 to 20 per cent. The theoretically corrected measured wave heights in shallow water are low. The University of California Mark III and Mark V recorders are described and typical records from the latter are reproduced. The limitations of the available information on spar buoy damping disc systems for deep water measurements are summarized.

61. Folsom, R. G.

OBSERVATIONS AND MEASUREMENTS OF WAVES AT SEA - I. University of California at Berkeley, Fluid Mechanics Lab. Technical rept. no. HE-116-50, 27 Jan 45, 16p.

62. Folsom, R. G.
TEST WITH AN ANCHORED FLOAT WITH GRADUATED MAST. University of California at Berkeley, Fluid Mechanics Lab. Technical rept. no. HE-116-24, 11 Nov 44, 2p.

63. Folsom, R. G.
WAVE MEASUREMENT IN DEEP WATER WITH RECORDING INSTRUMENTS. University of California at Berkeley, Fluid Mechanics Lab. Technical rept. no. HE-116-49, 16 Feb 45, 28p.

64. Folsom , T. R. , Jennings, F. D. and Schwartzlose, R. A.
Effect of pressure upon the "protected" oceanographic reversing thermometer.
DEEP-SEA RESEARCH (NEW YORK) v. 5, n. 4, p. 306-309, May 1959.

Actual degree of protection offered by the shell of the usual "protected" reversing thermometer has been computed. It appears that in the average modern instrument errors of roughly 0.002°C per 1000 m sea depth change can be expected. However, certain protected instruments having an exceptionally small air volume below the cork have been found to be influenced by external pressure changes to as much as 0.008° per 1,000 m particularly at great sea depths.

65. Folsom, T. R. and Mohanrao, G. J.
Measurement of fallout cesium in the Pacific Ocean and in terrestrial effluents

65. (cont'd) likely to alter coastal waters. J. RADIATION RESEARCH (JAPAN) v. 1, p. 150-4, Sep 1960. (In English)

A chemical technique is developed for concentrating races of fall-out Cesium-137 in sea water (and in sewage) so that assay can be made rapidly with a gamma ray spectrometer. Measurements are made of Cs^{137} in sea waters of the eastern Pacific, especially near shore, and data are compared with fall-out contamination reported elsewhere. Also a contemporary vertical profile of Cs^{137} activity in the Pacific is given. The behavior of fall-out activity in a large modern sewage treatment plant and in its oceanic out-fall are discussed, and estimates are made of the probable effects in coastal areas.

66. Forsberg, C.

Quantitative sampling of subaquatic vegetation.

OIKOS v. 10, n. 2, p. 233-240, 1959.

A sampler for obtaining quantitative samples of subaquatic vegetation is described and figured. The sampler is suitable for sampling soft bottoms only, and it samples decimeter plots from below. This reduces damage and loss of vegetation as compared to other sampling methods. Accuracy of sampling was ascertained by comparison with samples obtained manually by diving. Results of sampling of subaquatic meadows of Myriophyllum verticillatum and Nitella mucronata in Osbysjon in 1958 are described. From samples gathered at different dates a production of 2.8 gr/m^2/day is calculated for M. verticillatum and 2.5 gr/m^2 day for N. mucronata during the period of greatest growth. In autumn, production of both species is negative.

67. Foti, S. C. and Frieling, E. C.

OXIDATION STATES OF U^{237} AMD Np^{239} IN UNDERWATER BURST DEBRIS. Naval Radiological Defense Lab., San Francisco.

Rept. no. USNRDL-TR-370, 24 Sep 1959, 24.

A procedure is described which separates the U and Np present in seawater into their various oxidation states. Application of the procedure to ultrafiltrates of surface water samples from an underwater burst and a lagoon bottom burst is described. Results are presented as a function of time and correlated with physical state distributions made on the samples.

68. Franklin, W. R. and Anderson, D. V.
A bottom sediment sampler. LIMNOL. AND OCEANOG. v. 6, n. 2, p. 233-235, 1961.

69. Fremling, C. R.
Screened pail for sifting bottom-fauna samples. LIMNOL. AND OCEANOGR. v. 6, n. 1, p. 96, 1961.

70. Gardner, S.
ELECTRO-ACOUSTIC PROPERTIES OF THE UNDERWATER SPARK DISCHARGE. Edo Corp., College Point, New York. Rept. no. 5480, 1 June 61, 74p. (Contract Nonr-228800)
ASTIA AD-259 947

An investigation was made of the underwater spark discharge as a means of converting electrical to acoustic energy. The medium is a fundamental part of the transduction process. An underwater spark discharge is formed by switching an energy storage capacitor at a high voltage to a pair of submerged electrodes. An ionized plasma at high temperature and pressure is formed between the electrodes. The pressure within the plasma is transmitted to the surrounding water as a wave of compression similar to the shock wave created by an underwater explosion. An analysis of the electro-acoustic properties of the underwater spark is presented. The sonic energy radiated from the underwater spark discharge is discussed, and the directional properties of the radiated pressure are derived. Properties of the underwater spark discharge plasma as a circuit element are investigated. An electrical equivalent for the discharge circuit is developed from a knowledge of the variation of channel area with time. The theoretical results are compared with experimental ones for a fresh water underwater spark discharge.

71. Garrison, G. R., Murphy, S. R. and Potter, D. S. Measurements of the bakscattering of underwater sound from the sea surface. ACOUSTICAL SOCIETY OF AMERICA JOURNAL v. 32, n. 1, p. 104-111, Jan 1960.

Measurements of the backscattering of 60-kc sound from the surface of the sea have been made in Puget Sound in an effort to relate the strength of the scattered sound to the character of the surface. In addition to providing a means of predicting reverberation levels, an attempt has been made to obtain a better understanding of the fundamental mechanism of scattering at the air-water boundary. The reverberation measurements are presented, along with observations of several oceanographic and meteorological parameters. An examination of the data allows the following conclusions (1) reverberation pulses from an area of several square yards follow a Rayleigh distribution; (2) reverberation cannot be directly related to the wave height, but is closely correlated with wind speed; (3) reverberation increases with wind speed to a speed of 14 knots, and remains constant for higher wind speeds; and (4) reverberation is independent of the angle with the surface for angles from 20 to 60 degrees, but drops off rapidly as the angle is decreased below 20 degrees.

72. Gaul, R. D. and Schule, J. J. Oceanographic requirements versus instrumentation capabilities. PROC. INSTRUM. SOC. AMER. v. 15, n. 2, Paper 78-NY60, 1960, 6p.

Some problems of oceanographic instrumentation are discussed.

73. Gerard, R. and Ewing, M. A LARGE VOLUME WATER SAMPLER. Rept. no. TID-12498, Mar 61, 13p. (Contract AT (30-1)808 and CU-11-61-AT(30-1)1808 Geol).

73. (cont'd) A 220-liter sampler is described which has been used successfully to collect more than 300 subsurface water samples for radioisotope measurement. The water sampler is fitted with a single door which can be sealed securely with an "O" ring seal. A reversing thermometer pair and a bourdon recorder are provided to indicate the depth of closing. The sampler can be made for use with an hydrographic wire or a larger diameter trawl wire. An inert plastic lining may be applied to the sampler for the collection of samples which are affected by metal contact.

74. German, J. C.

An inductive salinity meter for in situ measurements. JOURN. CONSEIL PERM. INTERNATL. EXPLOR. MER v. 26, n. 1, p. 21-32, 1960.

The main feature of this in situ temperature and salinity measuring apparatus is that the A. C. bridge for use with the induction type probe is placed in the underwater unit, and the balance position is transmitted to the surface by D. C. measurement. This avoids the effect of cable impedances on the A. C. bridge. D. C. measurement over the cable is convenient, because it is also used to indicate the temperature by means of a thermistor. Precision resistors are not required in the underwater unit, and D. C. measurement over the cable enables a much longer cable to be used. The accuracy of the first model is estimated to be $\pm$ 0.03%.

75. Goerland, V. P.

Handling, towing and stowing of oceanographic research equipment. PROC. INSTRUM. SOC. AMER. v. 15, n. 1, Paper 19-NY60, 1960.

Some problems in the construction and use of oceanographic research instruments are discussed.

76. Gomolunov, K. A.

Instructions for observation of temperature, salinity, transparency and color of sea water. LENINGRAD. ARKTICHESKII NAUCHNO-ISSLEDO-

76. (cont'd) VATEL'SKII INSTITUT. POSOBIIA I RUKOVODSTVA, v. 4, 88p, 1944. (In Russian)

Contains a brief description of the instruments and detailed procedure for obtaining consistent observations. The Zobov reversing thermometers are described with illustrations; also bathometers of the International Hydrographic Laboratory, Nansen and Knudsen bottles for obtaining water samples from the deep layers; and the Secchi disc for transparency observations of surface water. The depth of submerged instruments are corrected (tables) for curvature of the cable. The appendix contains sample recordings of deep-water analysis observations from the Smol'nyi in the Bering Sea, 1941, and preliminary analysis of the temperature taken.

77. Gomoiunov, K. A. Using home-made tide-gauges in the Arctic; from work of the Hydrological Section. LENINGRAD. ARKTICHESKII NAUCHO-ISSLEDOVATEL'SKII INSTITUT. BULLETEN' v. 5, n. 12, p. 429-31, 1935. (In Russian)

Description of two tide-gages, one constructed by V. E. Petersen and used by the polar station in Russkaya Gavan' and the other by I. P. Kudin for the Cape Shmidta Station.

78. Gongwer, C. A. and Finkle, E. Turbulence meter - an instrument for oceanographic research. PROC. INSTRUM. SOC. AMER. v. 15, n. 1, Paper 23-NY60, 1960.

A description is given of a sensitive turbulence meter developed by the Aerojet-General Corp., U. S. A.

79. Grzenda, A.R. and Brehmer, M.L.
A quantitative method for the collection and measurement of stream periphyton. LIMNOL. AND OCEANOG. v. 5, n. 2, p. 190-194, 1960.

Two methods for the collection and estimation of stream periphyton production are presented. The periphyton was collected on 1.4 dm^2 plexiglass plates attached to a horizontal crossbar. The crossbar was supported by a vertical post driven into the stream bottom or supported by a concrete block. The plates were removed from the stream and the established population estimated by determining the absorbency of the ethanol-soluble phytopigments and by gravimetric procedures. A reliable estimate of the population can be made from the phytopigment absorbency values if the latter are corrected for deviations from the absorbency; concentration relationship and if the substrata are removed from the stream before the growth is too profuse. Confidence limits are given for the phytopigment density: weight of organic material relationship.

80. Guntelberg, V. C
RESEARCH ANALYSIS OF SOUND CONDITIONS IN DANISH WATERS (U). Danish Defence Research Board. Progress rept. for 1 July - 31 Dec 60, Feb 61, 7p. (Contract D-02-MWP-N-60) ASTIA AD-322 798.
CONFIDENTIAL REPORT

81. Gurvich, V.V. and Tseyeb, Y.Y.
A microbenthometer for the quantitative sampling of microbenthos. (Mikrobentometr dlya vzyatiya kolichestvennykh prob mikrobentosa). DOPOVIDI AKAD. NAUK UKRAIN. RSR v. 10, p. 1120-1123, 1958.

81. (cont'd) A device with the aid of which slit samples can be taken from the bottom of water reservoirs for counting benthonic microfauna was designed on the principle of taking monolithic samples, and represents an improved version of the Tseyeb tube. The main parts of the device are manufactured by the Leningrad "Gidrometpriladʺ plant. The functioning of this device is described, and how to operate it.

82. Hashimoto, T. and Nishimura, M.

Fishing sonar uses compact scan system.

ELECTRONICS v. 32, n. 14, p. 54-56, 1959.

Improved 200-kc ultrasonic system, sensitive up to a radius of 300 m centering around a small fishing boat, detects exact location of schools of small fish vital to Japanese economy.

83. Hashimoto, T., Nishimura, M. and Maniwa, Y.

Detection of fish by sonobuoy. BULL.

JAPANESE SOC. SCI. FISH v. 26, n. 3,

p. 245-249, 1960. (In Japanese with English

Summary)

Detection of fish shoals by their swimming sounds is usually made by research vessels, or in case of set net fishing, by cable transmission to coastal receiving stations. The sonobuoy offers an easier and more economic method. Observations are made by setting several sonobuoys at sea and receiving the underwater sound by radio at a coastal station. The sonobuoy device consists of a hydrophone, audio-amplifier, radio transmitter and receiver, speaker, pen-recorder and tape recorder. The underwater signal received by hydrophone is recorded on a pen-recorder or on the magnetic tape recorder. The effective communication range of the sonobuoy is up to 10 km. Observations obtained at fixed set net fishing grounds have demonstrated that the sonobuoy can distinguish the sound of fish schools (mainly yellowtail) from the sea noise, and that the frequency of sound generation at the entrance of a set net has a relation to the probable catch of yellowtail.

84. Haslett, R. W. G.

The quantitative evaluation of echo-sounder

signals from fish. J. BRIT. INSTN. RADIO

ENGRS. v. 22, n. 1, p. 33-42, July 1961.

85. Herdman, H. F. P.

Design for an ocean going research ship.

AMERICAN SOCIETY OF NAVAL ENGINEERS,

JOURNAL v. 72, n. 1, p. 147-52, Feb 1960.

The scope of requirements is considered in view of the diversity of oceanographic projects, personnel, and instrumentation needed. A 1475 tons gross vessel is suggested, with turboelectric propulsion for quiet running and speeds of 1 to 1-1/2 knots as needed. Space and deck arrangements are presented and a profile diagram is included.

86. Herdman, H. F. P.

Proposals for an ocean-going research ship.

DISCOVERY v. 2, n. 5, p. 199-203, 1960.

Suggestions are given for general design, space needs, facilities and equipment required for long-range oceanographic vessel.

87. Hersey, J. B., et al

Pingers and thumpers advance deep-sea

exploration. I. S. A. J. v. 8, n. 1, p. 72-77,

Jan 1961.

Descriptions are given of a sonar pinger, used in distance measurement, and a sonar thumper, a device for releasing a large amount of acoustical energy into water in the form of a clear, 1. f. repeatable pulse. The thumps are a substitute for the explosions sometimes used for studies of the earth's crust under the sea. A shorter account of the thumper appears in ELECTRONICS v. 34, n. 5, p. 56-57, 3 Feb 1961.

88. Hersey, J. B., et al

Sonar uses in oceanography. PROC.

INSTRUM. SOC. AMER. v. 15, n. 1,

Paper 21-NY60, 1960, 9p.

Descriptions are given of the sonar pinger and thumper transducers.

89. Herzen, R. von and Maxwell, A.E.
The measurement of thermal conductivity of deep-sea sediments of a needle-probe method. JOURNAL OF GEOPHYSICAL RESEARCH v. 64, n. 10, p. 1557-63, Oct 1959.

The transient heating of a needle probe is used to measure the thermal conductivity of deep-sea sediments in 10 minutes or less. An accuracy of 3% to 4% compares favorably with steady-state methods, and measurements by both methods on the same sediments show good agreement. Thermal diffusivity of deep-sea sediments is shown to be proportional to thermal conductivity, in agreement with theoretical expectations.

90. Hiedemann, E.A.
OPTICAL METHODS FOR ABSOLUTE MEASUREMENT OF SOUND PRESSURE IN LIQUIDS. Ultrasonics Lab., Michigan State Univ., East Lansing. Technical rept. no. 3, Feb 61. (Contract Nonr-258701, Proj. NR 385-425) ASTIA AD-250 060

Presented at the 59th meeting of the Acoustical Society of America, Brown University, Providence, R.I., 1960. This report includes: DETERMINATION OF THE RATIO B/A FROM OPTICAL MEASUREMENTS, by M. A. Breazeale, 1960. MEASUREMENT OF SOUND-PRESSURE AMPLITUDE BY OPTICAL METHODS, by M. A. Breaseale, L. E. Hargrove, and E.A. Hiedemann, 1960. (Reprint from U.S. Navy Journal of Underwater Acoustics v. 10, p. 381-387, July 1960). DETERMINATION OF ULTRASONIC VELOCITIES BY MEASUREMENT OF ANGLES OF TOTAL REFLECTION, by Walter G. Mayer, 6 June 60. (Reprint from the Journal of the Acoustical Society of America v. 32, p. 1213-1215, Oct 1960). LIGHT DIFFRACTION BY PROGRESSIVE ULTRASONIC WAVES, by Walter G. Mayer, 1960, 11p. (Copies not supplied by ASTIA).

91. Hold, J.

Fishing vessel and gear developments. Equipment note no. 3 -- New diving sled for underwater photography. COMMERCIAL FISH. REV. v. 22, n. 5, p. 10-12, 1960.

The two-man sled has brackets below to support motion picture cameras. Stability and maneuverability are considered to be good. Photographs and diagrams with dimensions of the sled supplement the description.

92. Holmes, J. F. and Worthington, L. V.

PROJECT SKIJUMP, CONDUCTED DURING THE PF IIOD FEBRUARY 1951 - MAY 1951. Woods Hole, Mass., Oceanographic Institution. Technical report. Reference no. 51-67, Sep 51, 66p.

In 1951, twelve landings were made on the ice, between 100 and 400 miles from the northern coast of Alaska, to obtain oceanographic data. The ten-man party included two civilian oceanographers and eight U. S. Navy personnel. Some of the landings, the oceanographic equipment, and the aircraft are briefly described. Items of clothing worn on the project are listed with comment on their efficiency and comfort.

93. Holmes, R. W. and Snodgrass, J. M.

A multiple-detector irradiance meter and electronic depth-sensing unit for use in biological oceanography. JOUR. MARINE RES. v. 19, n. 1, p. 40-56, 1961.

The underwater irradiance meter or submarine photometer described here is designed to operate in the upper 100 to 150 m. It permits direct measurement of the downward blue-green irradiance (480 mμ) to a depth of 100-120 m on a clear day in water with an attenuation coefficient in the blue-green region of the spectrum of approximately 0.04/m. The meter can accommodate as many as five individual detector units as

93. (cont'd) well as an associated depth-sensing element. The detectors are cosine flux collectors, equipped with a dry disk, self-generating, barrier layer cell. Any single detector unit may be readily oriented up, down, or horizontally. Selection among the detectors is made by energizing the switching mechanism with a push button. Their output is measured in the vessel's laboratory with a damped multi-range microammeter of low internal resistance. The associated depth-sensing unit is transistorized and battery-powered and is capable of measuring depth down to 200 m with an accuracy of $\pm$ 2% in the 50-200 m range. The unit is stable, rugged, and relatively insensitive to temperature changes in the range between 2° and 25° C. The detector and depth signals are carried out by a two-conductor electrical cable, which also supports the instrument. A sea return is utilized in the detector unit switching assembly.

94. Hooper, F. F., Podaliak, H. A. and Snieszko, S. F.
Use of radioisotopes in hydrobiology and fish culture. TRANS. AMER. FISH. SOC. v. 90, n. 1, p. 49-57, 1961.

Use of radioisotopes has increased rapidly in hydrobiology and fish culture. Their use, especially p^{32}, to study circulation of nutrients has been demonstrated and offers opportunities in problems of lake metabolism. The most extensive use of isotopes has been to determine photosynthetic activity in plankton through C^{14} uptake. Applications and limitations are discussed. Isotopes have been successfully used in food studies of fish to determine food selection, metabolism, and storage. Water movements in fresh and salt water and in sewage problems have been successfully followed by use of various isotopes. Marking of aquatic animals with radioisotopes has many possible applications, but has been little used because of some inherent problems related to danger to organisms and in field use. Extent of future use of isotopes in hydrobiology will be determined by further study of hazards and public acceptance of field studies.

95. Houot, G.
The bathyscaphe and the exploration of the ocean depths. Paris, Centre National de la Recherche Scientifique. In TOPOGRAPHIE ET LA GEOLOGIE DES PROFONDEURS OCEANIQUES. p. 233-37, 1959. (In French)

95. (cont'd) This paper describes the bathyscaphe and its equipment, and its method of operation. Results obtained, particularly in the realm of physical and biological oceanography are presented.

96. Hudson Labs., Columbia Univ., Dobbs Ferry, N.Y. S

(NO TITLE) Status rept. no. 11, 1 Sep 59 - 31 Aug 60, 25 Nov 60, 55p. (Contract N6onr-27135; CU-114-60-ONR-271-Phys.) ASTIA AD-322 828L. SECRET REPORT

Notice: All requests require approval of Office of Naval Research, Wash. 25, D.C. Attn: Code 466.

97. Hughes, R. T.

GAMMA INSTRUMENT - SUNKEN RAY RECORDER. University of California at Berkeley, Fluid Mechanics Lab. Technical rept. no. HE-116-209, 7 May 46, 3p.

98. Hydrographic Office, Washington, D.C.

SUBMARINE OCEANOGRAPHIC DIGITAL DATA SYSTEM. Technical rept. no. 88, June 61, 26p. ASTIA AD-262 660

A system for sensing, processing, and recording sound velocity, sea water temperature, wave heights, ambient light, data, time, transducer depth, and certain ship motions is described. The system is digital and is designed principally for use aboard submarines. The output is punched paper tape for computer entry and all variables are displayed and recorded in their absolute units. The system, in a slightly modified form, is now in use aboard the USS ARCHERFISH (AGSS-311). Examples of data and block diagrams of the system are given.

99. Inoue, N., Nishizawa, S. and Fukuda, M. The perfection of a turbidity meter and the photographic study of suspended matter and plankton in the sea using an undersea observation chamber. In PROCEEDINGS OF THE UNESCO SYMPOSIUM ON PHYSICAL OCEANOGRAPHY (TOKYO) p. 53-58, 1955.

Two types of turbidity meters have been constructed and are described. Results obtained with these instruments are presented. The chamber, named the KUROSHI-OGO, was constructed in 1951. This undersea laboratory can take two to three men down to a depth of 200 meters for a period of three to five hours.

100. Isaacs, J. D. and Schick, G. B. Deep-sea free instrument vehicle. DEEP-SEA RESEARCH (LONDON) v. 7, n. 1, p. 61-67, Aug 1960.

A number of free instrument vehicles have been designed and tested. These are simple, reliable, inexpensive devices that transport recording instruments or sampling equipment to the deep-sea bottom, or to intermediate depth, and return them to the surface. Vehicles are provided with radar reflectors and other location devices. In the first tests the vehicles bore fish traps and were successfully operated to 2,000 fathoms. Other instruments designed to make use of the free vehicle's unique capabilities are under development.

101. Isaacs, J. D. and Wiegel, R. L. THE THERMOPILE WAVE METER. University of California at Berkeley, Institute of Engineering Research. Technical rept. Series 3, Issue 311, 1950, 6p. (Also in: AMERICAN GEOPHYSICAL UNION TRANS-

101. (cont'd) ACTIONS v. 31, n. 5, p. 711-16, Oct 1950)

The thermopile or Mark V wave meter is designed to be a low cost, simple yet durable instrument which can be considered expendable upon its installation in the ocean. Its electrical characteristics are such that the cable requirements are not rigorous. Its construction is simple. A synthetic rubber bellows is mounted on a plastic base which is in turn mounted on a brass cable connection. A thermopile is mounted inside the bellows with one group of junctions, insulated from the air chamber, in thermal contact with the surrounding water. Thus when a wave passes over the unit, the crest and trough produce a compression and expansion of the bellows with the coresponding temperature change in the gas due to the polytropic cycle. The temperature difference between the air chamber and the sea water causes an emf from the thermopile, which is transmitted to shore by means of a two-conductor submarine cable, and recorded on a commercial null recorder.

102. Ivanoff, A.

About improvements in the study of the light diffused by samples of sea water, and results obtained off Monaco. ACADEMIE DES SCIENCES, PARIS, COMPTES RENDUS v. 250, n. 4, p. 736-38, 25 Jan 1960. (In French)

The technique of studying the diffusion and polarizing properties of sea water samples, taken with classical tip-up bottles and then decanted in a diffusometer presents numerous disadvantages: alteration and pollution of the samples by decanting and increase of temperature, formation of vapor, precipitation of suspended particles, etc. These disadvantages are decreased with the new apparatus, which is described. It consists of special glass bottles for taking samples and which, after the samples have been taken and without being opened, are themselves introduced in the measuring apparatus where they are dipped in water at the ambient temperature to avoid any formation of vapor and brought into a rotary motion about their axis to avoid precipitation of suspended particles. The results obtained off Monaco and between Monaco and Corsica are given.

103. Ivanoff, A.

Optical method of investigation of the oceans: the p-β diagram. OPTICAL

103. (cont'd) SOCIETY OF AMERICA, JOURNAL v. 49, n. 1, p. 103-104, Jan 1959.

A note introducing the factor p (degree of polarization) and suggesting the use of the p-β diagram to improve the optical methods of investigation of the oceans. A diagram of the apparatus, used to measure the degree of polarization and its scattering coefficient β is graphically represented. A specific example of the p-β diagram, obtained May 6, 1958 in the Mediterranean Sea, 43°34'N and 7°28'E, is discussed and graphically presented, and the conclusions deduced therefrom concerning the application of p-β diagram are stated.

104. Iversen, H. W. SIGHTING BAR FOR OBSERVATIONS OF BREAKER HEIGHT AND DISTANCE TO BREAKERS. University of California at Berkeley, Fluid Mechanics Lab. Technical rept. no. HE-116-42, 3 Jan 45, 5p.

105. Iwasa, K. An instrument for measuring directly the velocity, direction of the current and the temperature (the direct-reading current meter, Model CM-3). In PROCEEDINGS OF THE UNESCO SYMPOSIUM ON PHYSICAL OCEANOGRAPHY (TOKYO) p. 27-29, 1955.

The instrument is described in detail and the wiring diagram is presented. In addition to its oceanographic applications, the instrument is useful in commercial fishing.

106. Johnson, H. R. C

(Title possibly Classified) Hudson Labs., Columbia Univ., Dobbs Ferry, New York. ARTEMIS rept. no. 16; Reference no. 61-15, May 61, 3p. (Contract Nonr-26666, In cooperation with Woods Hole Oceanographic Institute, Mass., Contract Nonr-286600) ASTIA AD-325 433. CONFIDENTIAL REPORT

107. Joseph, J.

Extinction measurements to indicate distribution and transport of water-masses. In PROCEEDINGS OF THE UNESCO SYMPOSIUM ON PHYSICAL OCEANOGRAPHY (TOKYO) p. 59-75, 1955.

The transparency-temperature meter, a submersible photometer, is described. Since it carries its own light source, unlike those depending upon daylight, this instrument can be used at night and under unfavorable weather conditions. It is useable to a depth of 200 meters and its range may be extended to 500 meters.

108. Karbaum, H.

Work with the echograph in continental waters. (Arbeiten mit dem echographen auf binnengewassern). WASSERWIRTSCHAFT-WASSERTECHNIk v. 9, n. 8, p. 360-63, 1959. (In German)

Results of experiments in the use of the echograph aboard the experimental vessel "Arthur Wechmann" for studying the profile of the water channel. The apparatus is described and compared to the usual procedure.

109. Kaufman, H. and Spong, R.

A FEASIBILITY STUDY FOR A SHIPBOARD

DATA COLLECTION SYSTEM. Electric Boat

Division, General Dynamics Corp., Groton, Conn.

Final rept. Rept. no. SPD 60-128; P60-224,

15 Dec 60, 18p. (Contract Nonr-264000)

ASTIA AD-259 010

Research is presented on a feasibility study of a shipboard data collection system. The first section describes the background of the study. The second section contains a description of the system that Electric Boat suggested in its proposal; it also contains a description of the system for collecting and recording ship speed, course, and elapsed time which was designed and assembled by Electric Boat's Human Factors Section and delivered to SubDevGru Two for installation on two submarines. The third section of this report describes the IBM 704 program developed by Electric Boat's Digital Computer Services Division for post-exercise reconstruction of ship tracks from data recorded during operations at sea.

110. Kawamoto, T.

The construction of parachchute drogue.

OCEANOGRAPHICAL MAGAZINE (TOKYO)

v. 10, n. 1, p. 9-12, June 1958.

As a part of the program of the IGY, the subsurface current in the polar front region of the western Pacific was measured with parachute drogue. Construction of the parachute drogue used in the measurements is described.

111. Kay, L.

Progress in underwater echo ranging.

BRIT. COMMUN. & ELECTRON. v. 8,

n. 10, p. 735-759, Oct 1961.

Results are discussed of recent sea trials with echo-sounding equipment in the Royal Research Ship Discovery II.

112. Kiselev, O. N.

Application of the echo-sounder for studying the relief and bottom of Barents Sea. PRIRODA v. 30, n. 1, p. 69-72, 1941. (In Russian)

Notes on the Hughes bathometer used during the cruise of the Persei in 1939, and preliminary report on results from its use for submarine topography and detection of type of bottom sediments.

113. Knauss, J. A.

OBSERVATIONS OF IRREGULAR MOTION IN THE OPEN OCEAN. Scripps Institution of Oceanography, University of California, La Jolla. 29 Feb 60, 2p. (Contract Nonr-221601, Proj. NR 083-005) ASTIA AD-247 867

Reprint from Deep-Sea Research v. 7, p. 68-69, 1960. Copies not supplied by ASTIA. Descriptors: Motion; Turbulence; Ocean currents*; Oceanographical data*; Buoys.

114. Labrique, J. P.

Direct current measurement of the electrical conductivity of waters. (La mesure en courant continu de la conductivite electrique des eaux). VEGETATIO v. 10, n. 1, p. 42-52, 1961. (English Summary)

At low conductivities errors using DC are lessened. Two portable instruments using a DC source and successfully employed for ecological purposes are described, with wiring charts, and illustrated. (1) A direct-reading conductivity bridge covering in 8 steps the scale from 0 to 25 micromhos/cm to 0 to 5 millimhos/cm, with an absolute precision of 3%. (2) A compensation conductivity bridge which, for conductivities less than 500 micromhos/cm, gives a reproducibility of 0.1% with an absolute precision of 28%.

115. Latham, W. S.

TECHNICAL SPECIFICATIONS OF THE MAGNETIC RECORDING SYSTEMS AVAILABLE AT THE UNDERWATER SOUND LABORATORY. VOLUME III. Navy Underwater Sound Lab., Fort Trumbull, New London, Conn. USL research rept. no. 492; Suppl. to USL research rept. no. 216 and 294 (ASTIA AD-100 672), 5 Apr 61, 71p. ASTIA AD-259 067

Technical specifications of magnetic recording instrumentation are published with data on the associated components which have been designed and built to augment these systems. These components include mechanical, electromagnetical, and electronic devices.

116. Lee, A.J. and Baxter, G. C.

A note on the use of the Nansen-Pattersson waterbottle. INTERNATIONAL COUNCIL FOR THE STUDY OF THE SEA. JOURNAL DU CONSEIL v. 23, n. 2, p. 157-60, 1958.

The efficiency of the bottle depends on the moment in which the filament of mercury is liberated in the thermometer and influences the exterior temperature sooner than the insulated inner chamber.

117. Leslie, C. B.

MEASUREMENTS OF OCEAN BOTTOM CHARACTERISTICS WITH A SHORT ACOUSTIC TUBE. Naval Ordnance Lab., White Oak, Md. NAVORD rept. no. 6809, 24 Oct 60, 45p. ASTIA AD-253 681

117. (cont'd) Measurements were made of the acoustic characteristics of lake, river and ocean bottoms. The bottom formed the open end termination of a short acoustic tube and determined the ratio of pressure to velocity at a point near the end of the tube. Measurements were made from 10 to 500 cps with a number of known liquid, rigid, and compliant terminations. In all cases the results agreed very well with theoretical calculations. Similar tests over several actual bottoms indicated that the bottoms acted like liquids at the higher frequencies, but as somewhat rigid solids at the lower frequencies.

118. Leslie, C. B.

NORMAL INCIDENCE MEASUREMENT OF ACOUSTIC BOTTOM CONSTANTS. Naval Ordnance Lab., White Oak, Md. NAVORD rept. no. 6832, 1 Nov 60, 26p. ASTIA AD-253 682

As a part of a project on shallow water propagation, a theory was developed to permit a simple determination of the density and sound velocity of a liquid bottom by measurements of the normal incidence reflection coefficient. The measured results showed considerable deviations from the predicted results. With the aid of results from other phases of the shallow water work, explanations are given for most of the discrepancies. Evidence is presented to show that with a point source at low frequencies, the bottom acts like a solid with rigidity and does not act like a liquid. The effects of gas bubbles in the bottom are presented and discussed in detail; they cause the bottom to act like a pressure release surface and reduce the sound velocity in the bottom to an unusually low value.

119. Ling, J. K.

A reversing thermometer for recording water temperatures close to the bottom. AUSTRALIAN JOURNAL OF SCIENCE v. 22, n. 3, p. 120-21, 1959.

120. LITERATURE ON METEOROLOGY, HYDROLOGY AND OCEANOGRAPHY IN 1959. JPRS-2752, 11p. (Trans. from METEOROL. I GIDROL. n. 4, p. 56-60, 1960)

This bibliography contains information on the hydrometeorological literature published in Russian during 1959.

121. LITERATURE ON METEOROLOGY, HYDROLOGY AND OCEANOGRAPHY FOR 1959. (Trans. from METEOROL. I GIDROL. n. 5, p. 56-8, May 1960 by U. S. Joint Publications Research Service, Washington, D. C. CSO:4683-N/1, Nov 60, 11p.)

This bibliography includes 39 references on hydrology, meteorology, and oceanography.

122. LITERATURE ON METEOROLOGY, HYDROLOGY AND OCEANOGRAPHY IN 1959. (Trans. from METEOROL. I GIDROL. n. 10, p. 55-8, 1960) 12p.

A bibliography is presented on meteorology, hydrology, agrometeorology, and oceanography. The references are taken from articles which appeared in Russian scientific and technical journals during 1959.

123. Lomask, M. and Frassetto, R. ACOUSTIC MEASUREMENTS IN DEEP WATER USING THE BATHYSCAPH. Hudson Labs., Columbia Univ., Dobbs Ferry, N.Y. (Sponsored by the Office of Naval Research).

123. (cont'd) Contribution no. 46, 4 Jan 60, 6p. ASTIA

AD-256 681

(Reprint from Journal of the Acoustical Society of America v. 32, p. 1028-1033, Aug 1960. Copies not supplied by ASTIA.) The Bathyscaph Trieste made a series of dives for scientific purposes in the summer of 1957 in the Mediterranean Sea. Part of the work consisted of simple acoustic measurements in the 10- to 500-cps frequency range, and is herein described. Ambient noise levels were measured with some detail as a function of depth, sea state, and frequency; and pressure levels from a surface source were measured as a function of depth at different ranges, one range before the energy concentrated in the sound channel, and one range afterwards. Finally, the capabilities and limitations of the Bathyscaph as a vehicle for acoustic experiments are discussed.

124. Loshvihilov, V. S.

A METHOD OF UNDERWATER STEREO-

PHOTOGRAPHY IN OCEANOGRAPHIC

INVESTIGATIONS. (Metod podvodnoi stereo-

fotos emki v okeanograficheskikh issledovaniiakh)

American Meteorological Society, Boston, Mass.

Dec 59, 16p. (Contract AF 19(604)6113) ASTIA

AD-245 751 (Trans. by R. M. Holden. Trans. no.

T-R-250 of PROBLEMY ARKTIKI v. 2, p. 205-218,

1957).

An experiment in the study of an ice cover by the underwater stereophotogrammetric photography method is described. This method makes it possible to take pictures of the relief of the underside of the ice, and reveals a whole series of new possibilities in the study of the ice cover.

125. Loveridge, B. A.

THE DETERMINATION OF COPPER,

CHROMIUM, LEAD AND MANGANESE IN

SEA WATER. United Kingdon Atomic Energy

125. (cont'd) Authority. Research Group. Atomic Energy Research Establishment, Harwell, Berks, England. May 60, 42p.

Radioactive tracers were used to confirm and establish methods for the separation and concentration of copper, chromium, lead, and manganese from sea water, prior to the determination of their concentrations spectrophotometrically. Detailed procedures are given for the determination of these elements at their natural concentrations in sea water. Average values found for soluble copper range from 0.9 to 1.5 μg per liter; for chromium 0.13 to 0.25 μg per liter; for lead 0.6 to 1.5 μg per liter; and for manganese 0.6 to 1.4 μg per liter. These four elements were found in sea water in association with suspended solid matter, which was removed by passing the sea water through filters capable of retaining particles with a diameter greater than about one micron. Procedures are given for the spectrometric determination of copper, chromium, lead, and manganese on the separated solids.

126. Lovett, J. R. and Sessions, S. H. AN INSTRUMENT FOR CONTINUOUS DEEP-SEA MEASUREMENT OF VELOCITY OF SOUND, TEMPERATURE, AND PRESSURE. Naval Ordnance Test Station, China Lake, Calif. NAVWEPS rept. no. 7650; NOTS TP 2673, 9 May 61, 24p. ASTIA AD-258 932

An electronic instrument for the concurrent measurement in the ocean of velocity of sound, temperature, and pressure has been designed and tested to depths in excess of 2,000 meters. This 70-lb transistorized instrument contains three sections: a modified NBS velocimeter for measuring velocity of sound, a Borg-Warner Vibrotron for pressure, and a NOTS thermistor-controlled Wien-bridge oscillator for temperature. Outputs from the 3 sections are fm signals, mixed for single-conductor cable transmission to the surface. Velocity of sound is transmitted in the band 2,775-3,225 cps, temperature in the band 5,000-8,000 cps, and pressure in the band 9,712-11,288 cps. Accuracy of measurement is sound velocity 0.3 m/sec, temperature 0.02 C, and pressure 1% in selected ranges of 0-1,000 and 0-2,000 psi.

127. Lovett, J. R. and Sessions, S. H.

An instrument for deep-sea measurement

of pressure, temperature and sound velocity.

PROC. INSTRUM. SOC. AMER. v. 15, n. 2,

Paper 70-NY60, 2p.

In the system described pressure is measured using a Vibrotron, temperature by means of a thermistor-controlled Wien bridge oscillator, and sound velocity with a modified National Bureau of Standards sing-around oscillator. F. M. telemetry is used.

128. Lund, J. W. G.

A simple counting chamber for nannoplankton.

LIMNOL. AND OCEANOG. v. 4, n. 1, p. 57-

65, 1959.

A simply made, cheap chamber for counting nonnoplankton is described with detailed instructions for maintenance, use, and testing its accuracy. If certain precautions are taken the results of counts made therein are distributed according to the Poisson series. The chamber itself is simply a rectangular tube.

129. Lyman, J., Barquist, R. F. and Wolf, A. V.

A new method for direct determination of

salinity. JOUR. MARINE RES. v. 17, p. 335-

340, 1958.

The solid material obtained upon freeze-drying sea water is not a true measure of salinity since it contains 9 or 10% water of crystallization, the exact content being a sensitive function of temperature and humidity. The residual water is determined with Karl Fischer reagent, although the method is not yet capable of yielding salinity with the precision hitherto obtainable through the Knudsen titration. Total salt ('), found by freeze-drying and determining residual water with Karl Fischer reagent, is the proportion of solid material when all of the bicarbonate is dehydrated at the rate of one water molecule per bicarbonate molecule and when the boric acid is dehydrated at the rate of three water molecules per boric acid molecule; however, the fate of the organic matter is uncertain. Neglecting organic matter, the theoretical ration of ' to S for ordinary oceanic chlorinites should be about 1.0028, compared with the ratio to S of 1.0046 found by Lyman and Fleming.

130. McClure, C. D., Nelson, H. F. and Huckabay, W. B.
Marine sonoprobe system, new tool for
geologic mapping. BULLETIN OF THE
AMERICAN ASSOCIATION OF PETROLEUM
GEOLOGISTS v. 42, n. 4, p. 701-16, Apr 1958.

Marine Sonoprobe system, a low-frequency seismic system which generates a pulse of sound energy with a dominant frequency of 3800 cycles per second, is described. Marine Sonoprobe profiles are presented which illustrate various geologic features. Factors effecting the quality of the records and the depth from which reflected signals may be recorded are: (1) boat speed and course with respect to wave motion and current direction; (2) instrument installation; (3) dominant frequency, pulse shape, and pulse energy; (4) water depth; and (5) such geologic conditions as thickness and depth of reflecting horizon, and possibly moisture content.

131. Mackenzie, K. V.
Sound-speed measurements utilizing the
bathyscaph Trieste. J. ACOUST. SOC.
AMER. v. 33, n. 8, p. 1113-1119, Aug 1961.

Sound speed measurements were obtained to a depth of 5760 m, as well as those made in shallow waters by velocimeters and Nansen bottles lowered from a surface ship. The acceleration of gravity was measured at a depth of 2286 m.

132. McLellan, H. J. and Leipper, D. F.
OCEANOGRAPHY AND METEOROLOGY OF THE
GULF OF MEXICO. Texas A. and M.
College, College Station. Annual final rept.
1 May 60 - 30 Apr 61. Ref. no. 61-15F,
1 June 61, 65p. (Contract N7onr-48702,
Proj. NR 083 036) ASTIA AD-259 706

Contents: (1) Physical oceanography and marine meteorology: Investigations of the Yucatan current, Study of the equatorial current system, Internal waves, Feasibility

132. (cont'd) of air-sea interaction research using automated systems, Gross air-sea interactions, Thermochemical properties of sea water; (2) Marine geophysics: Seismic refraction, Gravity investigations at sea; (3) Geology and geo-chemistry: Clay mineralogy of marine sediments and sedimentary processes, Carbonate sediments and environment of Campeche bank, The Campeche reefs, Distribution of foraminifera in the barrier reef and lagoon of British Honduras, The coral distribution and sediment constituents of Cayo Areas; (4) Instrumentation: Contouring temperature recorder.

133. McMahon, G. W.

NEW FLOATING LABORATORY FACILITATES

UNDERWATER ACOUSTIC MEASUREMENTS.

Naval Research Establishment, Canada.

1960, 4p. ASTIA AD-258 544

Reprint from Canadian Electronics Engineering, Feb 61. Copies not supplied by ASTIA.

134. McNabb, C. D.

Enumeration of freshwater phytoplankton

concentrated on the membrane filter.

LIMNOL. AND OCEANOGR. v. 5, n. 1, p. 57-61,

1960.

Individuals of the phytoplankton become distributed at random when concentrated on the membrane filter. The percentage of microscopic fields in which a species occurs may therefore be validly converted to a theoretical average number of individuals per field. The theoretical density thus obtained and the actual density determined by time-consuming counting are very nearly similar values when 25 or more fields are scored. An enumeration technique using this relationship is described. It has many advantages over commonly used procedures for concentrating the plankton and estimating the number of individuals in a sample.

135. Martynov, V. T.

THE APPEARANCE OF UNDERWATER LANDSLIDES ON THE ECHO TAPE. (Vyiavlenie podvodnykh opolznei po lente ekholota). American Meteorological Society, Boston, Mass. Apr 60, 11p. (Contract AF 19 (604)6113) ASTIA AD-251 860 (Trans. by R. Flagg. Trans. no. T-R-280 from PROBLEMY ARKTIKI v. 3, p. 95-101, 1958).

For reference at ASTIA Hq. only. This report cannot be satisfactorily reproduced; ASTIA does not furnish copies. Descriptors: *Avalanches, *Ocean bottom, Ocean currents, Sedimentation, Underwater sound equipment, Recording devices.

136. Meisels, M.

Oceanography - high tide for design ideas. ELECTRON. DESIGN v. 8, n. 13, 14, p. 40-51 and 34-43, 22 June and 6 July 1960.

Electronic instrumentation requirements in oceanography are reviewed, with particular reference to American equipment.

137. Milner, G. W. C., et al

The determination of uranium in sea water by pulse polarography. J. ELECTROANAL. CHEM. v. 2, p. 25-38 (AERE-R-3227), Jan - Feb 1961. (In English)

A procedure is described for the determination of the uranium content of sea water. The uranium is first separated and concentrated from 4 liters of sea water by solvent extraction with di-(2-ethylhexyl)-phosphoric acid in carbon tetrachloride. A further purification of the uranium is carried out by the extraction of uranyl nitrate into ethyl

137. (cont'd) acetate, and the uranium concentration is found by pulse polarography using the peak from a perchloric acid-tartrate supporting electrolyte. U-237 is employed as a radioactive tracer to measure the percentage recovery of uranium in the chemical separation process. The value obtained for English Channel water is $3.3 \pm 0.08 \mu g$ of u/l.

138. Miyake, Y. and Sugimura, Y.

Ionium-thorium chronology of deep sea sediments of the Western North Pacific Ocean. SCIENCE v. 133, n. 3467, p. 1823-1824, 1961.

The rate of deposition of deep-sea deposits collected at the depths of 6215 to 8450 m in the western part of the North Pacific Ocean was estimated by means of the ionium/thorium ratio. The ratio was determined by an alpha-ray spectrometer. Results showed the rate of 0.5 to 0.8 mm/10^3 yr for the upper 10-cm layer below the sea bottom.

139. Munk, W. H., Snodgrass, F. E. and Tucker, M. J.

Spectra of low-frequency ocean waves. SCRIPPS INSTITUTION OF OCEANOGRAPHY, BULLETIN v. 7, n. 4, p. 283-362, 1959.

A thorough monograph covering a wide variety of studies of "quiet" ocean waves ranging from the very long period tsunamis (10,000 seconds or nearly 3 hours) to short period (20 second) waves in the range of wind generated swell. Both off-shore vibrotron transducers and shore based recorders (digital and continuous recorders and pier tsunami recorders) were used and are discussed. Harmonic analysis was performed by electronic digital and analog computer techniques.

140. Nakano, M.

Some oceanographical instruments recently devised by the members of the Central Meteorological Observatory and its

140. (cont'd) subordinate organs. In PROCEEDINGS OF THE UNESCO SYMPOSIUM ON PHYSICAL OCEANOGRAPHY (TOKYO) p. 30-37, 1955.

A description is presented of the oceanographic instruments developed by members of the Central Meteorological Observatory of Japan. These instruments include current meters of various types, wave recorders and analyzers, several types of tide gages, a remote reading and recording mercury thermometer, and a plastic water bottle.

141. Nelepo, B. A. Gamma-spectrometric measurements of Atlantic Ocean water radioactivity. VESTNIK MOSKOV. UNIV. SER III. FIZ., ASTRON. n. 5, p. 36-42, Sep - Oct 1960. (In Russian)

The design and performance of apparatus constructed for measuring the γ spectra of sea water are described, and data are given from measurements made in 1959 between 22° 45'S latitude 63° 06' W longitude and 15° 22' N latitude 20° 56' W longitude. The uniform distribution of radioactivity indicates an atmospheric origin of contamination. Three well defined layers were observed between the surface and a depth of 120 m. The highest specific activity was in the upper 40-m layer; the intermediate layer exhibited a sharp drop in activity and had a passive layer under it with a negligible specific activity. The drop in specific activity is related to the half lives of identified elements (from 2 to 33 years).

142. New 'floating laboratory' ship for fisheries research. BRIT. COMMUN. & ELECTRON. v. 8, n. 5, p. 368, 371, May 1961.

Some of the equipment to be carried by the fisheries research vessel Clione, ordered by the Ministry of Agriculture, Fisheries and Food, U.K., is noted.

143. New York University's research ship "Action." JOURNAL OF GEOPHYSICAL RESEARCH v. 61, n. 4, p. 756, Dec 1956.

G. Neumann arranged for the purchase of the University's first research ship, the 65 foot schooner, "Action." Dr. Neumann, Professor of Oceanography, has studied ocean waves and is engaged in research on ocean atmosphere interaction and long range weather forecasting.

144. Nordstrom, S. G. and Folsom, T. R. Suggestion for eliminating pressure effects on protected reversing thermometers. DEEP-SEA RES. v. 6, n. 2, p. 169, 1960.

145. Nutt, D. C. BLUE DOLPHIN LABRADOR EXPEDITION, WINTER PROJECT 1952. FIELD REPORT. Hanover, N.H., Dartmouth College. Apr 52, 9p.

Contains a brief chronological account of the project planned as a continuation of oceanographic survey operations in summers 1950 and 1951 in the Hamilton Inlet-Lake Melville region. Physical observations for temperature, salinity (surface and subsurface), and ice thickness were made through the ice at various points in the estuary during March-April 1952 by a three-man party led by the writer. Methods are described and comments are made on equipment and on adequacy of clothing used during the project.

146. Oceanographic research vessel "Thalassa". SHIPBUILDING AND SHIPPING RECORD (LONDON) v. 95, n. 25, p. 810-12, June 1960.

Built by Chantiers et Ateliers Augustin-Normand, Thalassa will be operated by the Scientific and Technical Institution of French Fishing Industry. The vessel is fitted with biological and chemical laboratories and specimen tanks. Two Duvant diesel engines of 800 and 300 hp provide propulsion. A plan of the ship is included.

147. Oceanographic survey ship delivered.
MARINE ENGINEERING v. 65, n. 6,
p. 70-76, June 1960.

The vessel Surveyor was built for the U. S. Coast and Geodetic Survey by the National Steel and Shipbuilding Company. The main propulsion unit was supplied by DeLaval Steam Turbine Company and is designed to develop 3200 hp at 135 propeller rpm and max of 3520 at 139.5 rpm with steam conditions of 400 psig and 745 F, and condensor vacuum of 28 inches of mercury. The ship is described in detail.

148. Office of Naval Research
SYMPOSIUM ON OCEANOGRAPHIC
INSTRUMENTATION, RANCHO SANTA
FE, CALIFORNIA, 21-23 JUNE 1952.
National Research Council, Division of
Physical Sciences. Pub. no. 309, 233p.

A number of papers on the subject. Technical.

149. Officer, C. B.
Continuous seismic profiler aids marine
exploration. WORLD OIL v. 148, n. 5,
p. 107-10, 1959.

150. Officer, C. B. C
STUDIES OF AMBIENT NOISE OBSERVED
IN THE OCEAN (U). Geophysical Interpreta-
tion Co., Houston, Texas. Interim rept,
13 Oct 60, 13p. (Contract Nonr-272600)
ASTIA AD-321 205. CONFIDENTIAL REPORT

151. Ono, K.

The Ono's self-recording current meter.

In PROCEEDINGS OF THE UNESCO

SYMPOSIUM ON PHYSICAL OCEANOGRAPHY

(TOKYO) p. 26-27, 1955.

The self-recording current meter developed by the author is described. Diagrams and illustrations are presented.

152. Padberg, L. R., Jr.

NOVEL SOUND SOURCES. Navy Electronics

Lab., San Diego, Calif. Rept. for June 56 -

Sep 60; NEL rept. no. 990, 17 Oct 60, 63p.

ASTIA AD-260 282

Two different types of LF high-intensity sound sources have been developed which have both military and commercial potentialities: The underwater spark sound source is suitable for explosive echo ranging, particularly from a submarine, and shows promise as a source for long-range, active detection and for long-range underwater signaling. This source has been tested at a depth of 300 feet below the surface and generated peak pressures corresponding to an acoustic level in excess of 3 million watts for a broadband nondirectional condition. In the 1000-4000-c/s frequency band, a corresponding acoustic level in excess of 300,000 watts was developed for a nondirectional condition. The pneumatic sound source, is probably the simplest generator of underwater sound yet discovered (in its lightest form it weighs less than 1 pound). This source has generated a peak acoustic level of over 4000 watts for a nondirectional condition, in the frequency range between 5 and 300 c/s.

153. Panteleev, N. A.

Instrumental determinations of the characteristics

of turbulent exchange in the ocean. VESTNIK

MOSKOVSKOGO UNIVERSITETA -- SERIYA

MATEMATIKI, MEKANIKI, ASTRONOMII,

FIZIKI, KHIMII n. 4, p. 141-47, 1959.

(Trans. by the U. S. Joint Publications

153. (cont'd) Research Service. Trans. no. JPRS: 5188, 2 Aug 60, 10p.)

The turbulimeter, model no. TM-4, adapted for shipboard use, is described and results obtained in the surface layer of the waters of the Antarctic sector of the Indian and Pacific oceans are presented. The research was done during the third voyage of the Naval Antarctic Expedition on the diesel-electric vessel "Ob" in January - February 1958.

154. Paquette, R. G., Scott, E. L. and Sund, P. N. An enlarged Clarke-Bumpus plankton sampler. LIMNOL. AND OCEANOGR. v. 6, n. 2, p. 230-233, 1961.

155. Paschalski, J. Attempt to use plastic for hydrobiological apparatus. (Proba zastosowania mas plastycznych do aparatury hydrobiologicznej). POLSKIE ARCH. HYDROBIOL. v. 6, p. 117-124, 1959. (Russian and English Summary)

Substitution of plexiglass for glass is convenient as this material is easy to handle and does not resist joining with metal. Plexiglass also has a strong mechanical resistance, a lower weight and heat conductivity than glass and does not react with water. On May 31, 1957 on the Mikolajskie Lake, measurements of water temperature were carried out using a thermistor and 2 decimal mercury thermometer simultaneously, both placed on Ruttner's scoops with glass and plexiglass cylinders. Insignificant differences in temperature data were found with the two types of scoops.

156. Peres, J. M.

Two biological dives in the Pacific Ocean with the Bathyscaphe F. N. R. S. III. C. R. ACAD. SCI. FR. v. 247, n. 9, p. 757-9, 1958.

157. Peterson, H. L. and Finney, W. J.

Selection and analysis of recorded acoustic data from the sea. AUTOMATIC CONTROL v. 12, n. 1, p. 48, 50, 52, Jan 1960.

Systems of data handling employed at the U. S. Naval Research Laboratory are described.

158. Pierce, F.

A DEEP-SEA RESEARCH VEHICLE. Naval Ordnance Test Station, China Lake, Calif. NAVWEPS rept. no. 7627; NOTS TP 2632, 27 Mar 61, 18p. ASTIA AD-254 731

A Deep-Sea Research Vehicle (DRV) is proposed that will be able to cruise at any depth at a 6-knot maximum speed, and will have a 3-knot range capability of 100 miles. The vehicle will carry a crew of three and will be equipped with scientific apparatus for fully exploring the deep-sea environment. Stable buoyancy will be achieved by using a nonflammable solution of ammonia in water.

159. Pochapsky, T. E.

Instrumentation of neutral floats. PROC. INSTRUM. SOC. AMER. v. 15, n. 1, Paper 27-NY60, 1960, 2p.

A short description is given of a neutrally buoyant float for the measurement of internal motions in the ocean.

160. Powell, G.

Radio aids to hydrography. WIRELESS

WORLD v. 66, n. 7, p. 351-58, July 1960.

Radio aids in the field of oceanographic surveying, involving ship-to-shore distances of several hundred miles, are discussed. Principles of the Decca two-range and labda position-fixing systems are presented, and the equipment is briefly described.

161. RADIOACTIVITY IN THE OCEANS,

USSR. Rept. no. JPRS-6838, 7 Mar 61,

16p. (Trans. from VESTNIK MOSKOV.

UNIV. n. 5, 1960).

Gamma spectrometric measurements were made of the radioactivity of the waters of the Atlantic Ocean. Data were recorded relative to the distribution of radioactive elements by depth at various sites. A scintillation detector was modified for use in the measurements. Data indicate that the contamination was of an atmospheric character, indicating a fall-out origin. Three distinct layers of radioactivity were found within the first 120 m. Characteristics of each are discussed. Results are also included from measurements of the total radioactivity of oceanic waters in the Antarctic sector of the Pacific Ocean. The radioactivity of the region investigated was twice the natural level. Data indicate that the contamination was of an atmospheric character. The most active part of the fall-out products was in the upper mixed layer at a depth of approximately 50 m. Radioactivity decreased between 50 and 150 m.

162. Ragozhkin, V. I.

Bathometer for taking water samples.

METEOROLOGIIA I GIDROLOGIIA

(LENINGRAD) n. 5, p. 54-55, May 1959.

(In Russian)

The bathometer described with the aid of diagrams consists of a plexiglass cylinder. Its operation is based upon one of the properties of a cranking-pumping mechanism -- the presence of inert points at two extreme positions. The bathometer is put into working condition by pulling off the lower cover by hand, simultaneously the upper cover is opened as a result of the displacement of a cross-bar fastened by ball bearings to a rod in the lower cover. The covers of the bathometer are held in the

162. (cont'd) open position by a spring covering the rod, one end of the spring being fastened to a bracket and the other directly to the rod. The presence of the spring within the bathometer and the relatively low heat conductivity of the plexiglass allows the bathometer to be used with ice at negative air temperature.

163. Rasche, R. W.

PRELIMINARY STUDY OF TWO PRINCIPLES

FOR PRECISE PRESSURE INDICATION.

Electronic Systems Lab., Mass. Inst. of

Tech., Cambridge. Rept. no. 8060-R-4,

Sep 60, 47p. (Contract Nonr-184153)

ASTIA AD-250 892

The problem of improved pressure measurement for depth sensing and other Naval applications is studied. A preliminary study was conducted of two techniques for precise pressure indication. Both techniques are characterized by measurement of a basic pressure-sensitive property, viz., the variation of the velocity of sound in liquid and the variation of dielectric constant of certain liquid dielectrics with pressure. Sea water pressure is transmitted to a suitable pressure-sensitive liquid and a velocity of sound or capacitance measurement made. Two methods of measuring the velocity of sound are analyzed for utilization as dynamic pressure indicators. Problems of capacitance measurement are discussed and further investigation necessary for their solution is indicated. The objectives of an experimental program required to facilitate sensor development are outlined. Preliminary analysis indicates that both techniques presented herein potentially offer improvement over existing techniques of pressure sensing and further investigation is recommended.

164. Rather, R. L.

State of the art. PROC. INSTRUM. SOC.

AMER. v. 15, n. 1, Paper 17-NY60, 1960,

24p.

Illustrated descriptions of some oceanographic instruments are given.

165. Rechnitzer, A. B.

THE 1957 DIVING PROGRAM OF THE BATHYSCAPH TRIESTE. Navy Electronics Lab., San Diego, Calif. NEL rept. no. 941, 28 Dec 59, 21p. ASTIA AD-254 537

A deep-sea research program involving 26 dives utilizing the bathyscaph TRIESTE was conducted in the Mediterranean Sea during the summer of 1957. Representatives of several U. S. government laboratories, assisted by British, Italian, and Swiss scientists, participated in the program, to study light penetration and make geological observations. Underwater communications and monitoring of ambient noises were satisfactorily maintained to 3200 meters depth. Ambient sunlight was visually detected to a depth of 500 meters. Between 450 and 600 meters, bioluminescence reached its maximum. Various populations of living organisms were present throughout the water column and on the sea floor and were found to have a marked influence on sedimentation processes on or near the sea floor.

166. Reid, J. L., Jr.

A comparison of drogue and GEK measurements in deep water. LIMNOLOGY AND OCEANOGRAPHY v. 3, n. 2, p. 160-65, Apr 1958.

Two series of current measurements made with GEK and drogues are shown to agree closely, not only in the averaged results of three days' data, but in short-period variations about the mean. The variations measured are probably too large to be the ordinary tide, and the possibility of their being the orbital velocities of internal waves is discussed.

167. Reish, D.J.

Modification of the Hayward orange-peel bucket for bottom sampling. ECOLOGY v. 40, n. 3, p. 502-503, 1959.

The modifications of a commercially manufactured bucket for biological bottom sampling are described and figured. The advantages and disadvantages of the apparatus are discussed.

168. Reish, D.J.

The use of the sediment bottle collector for monitoring polluted marine waters. CALIFORNIA FISH AND GAME v. 47, n. 3, p. 261-272, 1961.

Wide-mouth gallon jars were suspended at 7 stations for 28-day periods for 2 years in Los Angeles, Long Beach Harbors, California. Stations were selected in basis of the degree of pollution as determined from previous studies. Data were analyzed as to the species and number of species encountered, the presence or absence of odorous substrate within the bottle, percent of organic carbon of the substrate, and the dissolved oxygen content of the group of animals and the most representative of the degree of pollution. The use and application of the sediment bottle collector for monitoring marine areas or outfalls are discussed. The data are summarized in tabular and graphic form. The seasonal occurrences of the most prevalent species are discussed.

169. Richardson, W.S. and Wilkins, C.H.

An airborne radiation thermometer. DEEP-SEA RESEARCH (LONDON) v. 5, n. 1, p. 62-71, May 1958.

An air-borne radiation thermometer for use in measuring sea surface temperatures from aircraft is described. Infrared radiation from the water surface is compared to the radiation from a black body at known temperature within the instrument. The sensitivity is about 0.01°C. Errors attending such measurements are discussed, and several applications to oceanographic research are cited.

170. Rivers, W.K., Jr., et al

ACOUSTIC MODULATION OF THE CONDUC-TIVITY OF SALT SOLUTIONS. Georgia Inst. of Tech. Engineering Experiment Station, Atlanta. Technical rept. no. 1, 28 June 61, 40p. (Contract Nonr-99108,

170. (cont'd) Proj. NR 371-330) ASTIA AD-260 534

The fractional change of the conductivity of aqueous sodium chloride solutions produced by an acoustic wave were measured and found to be 0.7 x 10 to the -10th power per dyne/sq cm pressure change at room temperature over a concentration range of 0.3 to 3.0 molal. The measurements are consistent with predictions based on theory and static data and with previous measurements of the change in the low-frequency bulk conductivity of salt water produced by an acoustic wave. The measurements were made by reflecting electromagnetic and acoustic waves from the salt water surface in a coaxial test cell at a radio frequency of 146 mc and acoustic frequencies in the range of 15 to 30 kc. The equipment used is capable of measuring an amplitude modulation index lower than 160 db below 100% for 1 cps of bandwidth.

171. Taft, R. A.

FATE OF RADIOACTIVE CONTAMINANTS IN WATER. Sanitary Engineering Center, Cincinatti. Progress rept. no. 2 for 1 May 58 - 30 June 59. Rept. no. SEC-TR-R60-2; A/AC.82/G/L.571; TID-12884, 1960, 38p. (Contract AT(49-5)-1288)

Changes made in existing equipment to improve sensitivity are described and spectra shown for specific radioisotopes. Improvements of analytical and counting methods for tritium and radioisotopes in sea water and algae are discussed. Results are presented for laboratory and field samples collected at KAPL, Savannah River, and Shippingport.

172. Robinson, M. K.

Statistical evidence indicating no long-term climatic change in the deep waters of the North and South Pacific Oceans. JOURNAL OF GEOPHYSICAL RESEARCH v. 65, n. 7, p. 2097-2116, 1960.

172. (cont'd) No inference of climatic change appears to be warranted from an analysis of temperature and salinity values below 100 m at 189 oceanographic stations in the North and South Pacific Oceans. Data collected in the period 1929-1932 by the Carnegie, Dana, Scoresby, Discovery II, and International Fisheries expeditions were used as reference stations. The reference stations were paired with data collected between 1824 and 1958. Fifth % of the stations were within 60 naut mi of their reference stations, 30% were between 60 and 120 naut mi. and 20% were between 120 and 568 naut mi. The stations that were more than 120 naut mi from their reference stations were included in order to obtain additional deep-station values, but they were limited to the same water mass as the reference stations. The analysis showed large random individual differences in both fields down to 1000 m, and smaller but significant anomalies in several instances between 1000 and 5000 m. For the data grouped by years or by water mass, scattered significant differences were observed at all levels and in all groups. Much larger samples are needed to separate statistically the short-period variability and the instrumental,processing, and interpolation errors from long-period changes in deep waters.

173. Rockwell, J., Jr. and Chur, S. P.

An underwater observation chamber.

PROGR. FISH-CULTURIST v. 21, n. 3,

p. 131-134, 1959.

A submersible chamber suitable for use in observing and photographing underwater life is described. Details of construction, operation, and maintenance are discussed.

174. Rosenblatt, L.

DESIGN OF MODERN OCEANOGRAPHIC

RESEARCH SHIPS. Society of Naval Architects

and Marine Engineers. Paper no. 4, May 60,

53p.

Primary requirements with emphasis on seakeeping ability, reliability, maneuverability and acoustical quietness are discussed. Method of blockout design, desirable characteristics for U. S. oceanographic vessels over the next ten years, size range from 400 to 300 tons displacement, are presented. Tables give principle characteristics of U. S. and foreign research ships.

175. Rymsha, V. A.

Instrument for measuring the low velocities

of a water current. METEOROLOGIIA I

GIDROLOGIIA (LENINGRAD) v. 9, p. 44-46,

Sep 1958. (In Russian)

The construction of an apparatus for measuring water-current velocities in the range of 0 to 5 cm/sec is described. It utilizes a thermal principle based on the dependence between the velocity of a current flowing around a heated body and the intensity of heat transfer from this body to the water. The apparatus consists of a heated element with a heating coil, differential thermocouple, galvanometer, battery, milliammeter and rheostat. The physical properties of the various elements of the apparatus, the results of calibration of the apparatus and its use are described. The apparatus is illustrated with the aid of a diagram and photograph.

176. Sabinin, K. D.

A new instrument for determining the density

and salinity of sea water: the Cox salinometer.

METEOROLOGIIA I GIDROLOGIIA (LENINGRAD)

n. 12, p. 47-49, Dec 1958. (In Russian)

The apparatus for measuring salinity of sea water devised by R. A. Cox, which is based upon the floatation method of determining water density, is described with the aid of a diagram. A modification of this instrument developed in the oceanography department of the Moscow State University is presented. The valves were replaced by stopcocks with markings so as to regulate pressure more exactly. A diagram of the modified instrument is presented and its testing, precision and defects are discussed.

177. Sandouer, J. A. and Taylor, C.

Determination of the profiles of water waves.

J. SCI. INSTRUM. v. 37, n. 4, p. 141-143,

Apr 1960.

The construction and calibration of a capacitance depth gauge for the accurate recording of three dimensional water waves is described.

178. Sanuki, M. and Kimura, S.

Experiments on a marine combination wind vane and anemometer in pitching or rolling motion. PAPERS IN METEOROLOGY AND GEOPHYSICS (TOKYO) v. 5, n. 1, p. 35-40, Apr 1954.

A combination wind vane and anemometer model (Marine Speedovane) is tested in a wind tunnel, as to its mode of oscillation and variation of rotational speed in pitching or rolling motion caused by wind. According to this model experiment the pitching motion of a period of 8 sec (actual weather ship's value) has nothing to do with the indication of the wind vane, but it seriously affects the rotational speed of the anemometer windmill, which is oscillating with the same period as that of the pitching motion and with a certain phase lag. The mean rotational speed is found remarkably lower than that without pitching at the same wind speed. In the rolling motion of the same period, however, the mean rotational speed of the anemometer windmill agrees well with that without rolling at the same wind speed. No definite periodicity and phase lag of the rotation are found in this case except a certain band width of fluctuations.

179. Sasaki, T.

Three instruments constructed and employed in Japan. In PROCEEDINGS OF THE UNESCO SYMPOSIUM ON PHYSICAL OCEANOGRAPHY (TOKYO) p. 46-48, 1955.

A temperature depth recorder, an underwater camera, and a geomagnetic electrokinetograph (GEK) for measuring the velocity of ocean currents from a ship underway are described.

180. Sasaki, T., et al

Instrument for measuring angular distribution of submarine daylight. TOKYO, INSTITUTE OF PHYSICAL AND CHEMICAL RESEARCH,

180. (cont'd) REPORTS v. 34, n. 3, p. 163-70, May 1958.

Method of measuring angular distribution of submarine daylight has been studied and a new instrument constructed. The instrument is suspended down into the sea and the measurement carried out by remote control from on board a ship. This instrument has proved to be serviceable for research work. Observations made on the distribution in horizontal planes at varying depths down to 80 meters have led to a number of interesting results.

181. Saville, A.

Mesh selection in plankton nets. JOUR.

CONSEIL PERM. INTERNATL. EXPLOR.

MER v. 23, n. 2, p. 192-201, 1958.

To measure the extent of escape of various plankton organisms from a net made of silk with 60 threads to the inch, 16 hauls were made with a net of this material, fitted with an outer cover of finer mesh. The percentage escape of any species gave consistent results when plotted against size. From these graphs it can be deduced the Calanus is fully retained by this grade of silk only above the second copepodid state, Pseudocalanus above Stage IV, and Temora above Stage V. The data show release at a greater size than is compatible with a rigid square mesh and this conclusion has also been shown to apply to other grades of bolting silk. Laboratory experiments to investigate this situation have shown that the high release is due partly to a capacity on the part of the organism to be compressed and partly to a distortion of the meshes explicable from the nature of their construction.

182. Savur, S. R.

New ocean current meter. ANDHRA

UNIVERSITY, INDIA, MEMOIRS IN

OCEANOGRAPHY v. 1, p. 122-24, 1954.

The instrument is described in detail including two sketches featuring the construction. The measurement of ocean and/or river currents at the surface or any desired depth is directly obtained when certain precautions are taken.

183. Scanlon, T. S., Jr. and Osborn, P.

MARK II TSUNAMI RECORDER. Scripps Institute of Oceanography. Wave rept. no. 97, 1950, 12p.

184. Schaefer, J. V.

Remote preamplifiers for under ocean work.

ELECTRONICS v. 33, n. 28, p. 60-62, 8 July 1960.

Measurements of sea noise at sea state zero — the quietest condition — can be made with signal/noise ratios of 15 dB or more in the a.f. range, using cables and bottom-mounted hydrophones. The preamplifiers used with the hydrophones are described.

185. Scripps Institution of Oceanography

QUARTERLY PROGRESS REPORT ON OCEANOGRAPHIC INSTRUMENTATION. Scripps rept. no. SIO 56-66, Jul - Sep 53, 11p.

186. Shaffer, J. D.

Low frequency underwater sound velocity meter.

REV. SCI. INSTRUM. v. 31, n. 12, p. 1318-20, Dec 1960.

The meter employs an open-end heavy-walled tube for a resonant cavity. The water column is excited into vibration by a sound source near one end, while a hydrophone probe at the tube centre registers the pressure amplitude. A sharp resonator (Q = 450) permits making relative measurements with an uncertainty of less than 0.2 m/sec when the fundamental mode (f $\cong$ 570 c/s) is used.

187. Shaw, J.T.

Measurement of thermal phenomena by lapse-time photography. PROC. INSTRUM. SOC. AMER. v. 15, n. 2, Paper 63-NY60, 1960, 6p.

A description is given of a submerged recoverable buoy for the study of ocean variables; recording is by photography.

188. Shellard, H.D.

New British ocean weather ship. WEATHER (LONDON) v. 13, n. 7, p. 239-241, July 1958.

The "Weather Explorer," ended her last voyage May 8, 1958 and was replaced by the "Weather Reporter," an adequately converted and modernized Castle class frigate, on May 16, 1958. Description of the new weather ship and her instrumentation is given.

189. Shellard, H.D.

Some measurements of temperature and humidity profiles near the sea surface. MARINE OBSERVER (LONDON) v. 28, n. 182, p. 198-204, Oct 1958.

A detailed account of the apparatus known as a "thermobuoy" that has been developed to take accurate measurements of the gradients of temperature and humidity near the sea surface when winds are not much above 12 knots. Observations taken at Station India (59° N, 19° W) on July 6 and 9, 1956 from 120 cm to +300 cm, below and above the sea surface, and profiles drawn from the data, are presented in tables and graphs. Profiles of temperature, humidity and wind seem to be much the same. Results should be checked against similar measurements at other ocean weather stations.

190. Shesterikov, N.P.

Preliminary analysis of the drift of radio-beacons in arctic seas. PROBLEMY ARKTIKI, SBORNIK STATEI v. 2, p. 85-91, 1957. (In Russian)

190. (cont'd) The drifts of seven radio-beacons in the Kara, Laptev, and East Siberian Seas in 1955 and 1956 are analyzed, and the effects of various factors on changes in direction and speed are discussed. Data on the drifts are tabulated.

191. Shulepin, A.M.

Work of the Umba hydrometeorological station.

(Iz opyta raboty gidometeorologicheskoi stantsii Umba.) METEOROLOGIIA I GIDROLOGIIA (LENINGRAD) n. 8, p. 55-56, 1957.

The first order hydrometeorological station Umba (Murmansk Hydrometeorological Service) was organized in 1931 as a White Sea station of the State Hydrological Institute. The work of the station includes marine hydrometeorological observations and expeditions in the Gulf of Kandalaksha, meteorological and aerological observations for various branches of the national economy, for stations and river ports in southern part of the Kola Peninsula, etc. The method of work at this station, the educational activities, etc. are discussed briefly.

192. Small, L.F.

An optical density method of measuring phytoplankton standing crop. IOWA STATE JOUR. SCI. v. 35, n. 3, p. 343-353, 1961.

Estimation of phytoplankton standing crop involves collection of adequately representative samples and determination of the phytoplankton per sample. For each estimate, one liter of lake water was centrifuged in a continuous-flow centrifuge at the rate of one liter per eight minutes, the concentrate was made up to 30 milliliters with 90% reagent-grade acetone, and the extraction was allowed to take place for one-half hour at a constant temperature of 120° F. Longer extraction is more complete, but deterioration of chlorophyll may be greater than the increased extraction. Use of two liters per sample did not give better results than one liter samples. When the extraction phase was completed, the green supernate was read in a Bausch and Lomb "Spectronic 20" spectrophotometer at a 665 mμ wave length to obtain the optical density of chlorophyll "a". The optical densities can then be converted to "units of count" providing the species composition remains fairly constant.

193. Smith, L.

Telemetry automates oceanographic research.

ELECTRONICS v. 34, n. 38, p. 22-23, 22 Sep 1961.

A joint oceanographic research project by Texas A & M College and Southwest Research Institute is described briefly.

194. Smith, R.D.

The "Tellurometer" system — new applications to geodesy and hydrography. J. GEOPHYS. RES. v. 65, n. 2, p. 418-429, Feb 1960.

195. Snodgrass, F.E.

OCEAN WAVE MEASUREMENTS. University of California at Berkeley, Institute of Engineering Research, Waves Research Lab. Technical rept. Series 3, Issue 342, 1952, 40p.

196. Snodgrass, F.E.

Wave recorders. In FIRST CONFERENCE ON COASTAL ENGINEERING PROCESSES (BERKELEY) p. 69-81, 1951.

197. Snodgrass, F.E. and Stiling, D.E.

ANALYSIS OF WAVE RECORDERS. University of California, Berkeley Institute of Engineering Research. Series 3, Issue 307, 1951, 13p.

198. Snodgrass, J.M.

Consideration of future oceanographic instrumentation.

NATIONAL RESEARCH COUNCIL, WASH. D.C.,

PUBLICATION n. 473, p. 149-156, 1957.

The author enumerates recent instrumentation developed at the Scripps Institution of Oceanography under a contract with the Bureau of Ships. A description is given of the modern bathythermograph that is used for depth sensing. It bears the name of "Vibroton."

199. Snodgrass, J.M.

Introducing oceanography. I.S.A. J. v. 8, n. 8,

p. 75-79, Aug 1961. (To be cont'd)

This is the first of a new series of six articles sponsored by the Marine Sciences Division of the Instrument Society of America. Several instruments used in oceanography are described.

200. Snodgrass, J.M.

A telemetering oceanographic current meter.

PROC. INSTRUM. SOC. AMER. v. 15, n. 2,

Paper 62-NY60, 1960, 9p.

The meter, measuring current over four decades, also provides information on depth and current direction; it is connected to recording equipment on the deck of a ship by a two-conductor cable.

201. Snodgrass, J.M. and Cawley, J.H., Jr.

Bathythermometer telemeters ocean data.

ELECTRONICS v. 30, n. 5, p. 142-1 ,

1957.

A two-unit transistorized system lowered from ship gives plot of temperature against depth. Absolute accuracy in depth is better than ± 0.25 percent and temperature sensitivity of 0.05 degree C. can be obtained. Vibrating wire transducer and thermistor Wien-bridge oscillator provide depth and temperature data, respectively.

202. Spiess, F.N.

Acceleration measurements in the deep ocean.

JOURNAL OF MARINE RESEARCH v. 16,

n. 1, p. 23-33, 1957.

The study of surface waves in the deep ocean can be carried out effectively by using a new technique: measurement of accelerations of a small water mass well below the surface. Instrumentation for carrying out such measurements is described in detail, including a special accelerometer, neutrally buoyant case, long lightweight slack wire, and data-recording equipment. Some initial results achieved with this equipment are shown and the possibility of broader applications of this technique for wave and gravity measurements at sea are discussed briefly.

203. Srivastava, S.S., Narayana Rao, V. and Kartha, T.D.K.

Installation of ocean wave recorder at Trivandrum.

INDIAN JOURNAL OF METEOROLOGY AND

GEOPHYSICS (DELHI) v. 10, n. 3, p. 331-336,

July 1959.

This paper deals with the installation of the Ocean Wave Recorder carried out by the Indian Naval Physical Laboratory. Details of the pressure type of underwater wave recorder, the choice of the site for the installation and the actual details of the installation are dealt with. A brief review of the naval applications of ocean wave studies is also given.

204. Srivastava, S.S. and Raman, K.V.S.

Portable thermistor thermometer for estuarine

investigation. CURRENT SCIENCE (BANGALORE)

v. 28, n. 9, p. 362-63, Sep 1959.

A short note reporting the development of a portable thermistor thermometer which could be used for continuous measurements of temperatures for hydrologic studies in estuaries 50 to 100 feet deep. It was used to measure temperature variations in the Ernakulam channel to a depth of 30 feet. Thus, this device fulfills the need for accurate measurements in shallow water channels. The apparatus of the thermometer is described and the possibility of its use for various other situations is discussed.

205. Stephens, F.H., Jr.

Underwater telemeter for trawl fishing.

ELECTRONICS v. 32, n. 13, p. 66-68, 1959.

Telemeter determines the exact depth of trawl net under the water, making it easy to intercept schools of fish that travel at various depths. Continuous depth information is available down to 1200 feet. Temperature information is impressed on a modulated f-m carrier as an a-m tone.

206. Stewart, J.L., Westerfield, E.C. and Brandon, M.K.

Optimum frequencies for active sonar detection.

J. ACOUST. SOC. AMER. v. 33, n. 9, p. 1216-22,

Sep 1961.

The method of determination without knowledge of the absolute values of the sonar-set parameters, but only of their frequency dependence, appears to have been originated by Horton in about 1945 and is to be found in his recent text (Fundamentals of Sonar, United States Naval Institute, p. 317-24, 344-52, 1957). This theory has been simplified and extended to include search rate, time-processing gain, and the ratio of echo-to-noise-plus-reverberation. The inclusion of these new factors only slightly modifies the results obtained by maximizing echo-to-noise ratio alone because of the dominant effect of the frequency dependent exponential attenuation term in the transmission loss. Because of the octave or greater width of the maxima and the lack of precision in the knowledge of the frequency dependencies, the optimum frequencies should be looked on only as broad regions. For longer-range and hence lower-frequency active sonars operating at their optimum frequencies the energy of the pulse required per unit area of volume searched increases rapidly with the design range to a high exponent for the cases considered. This corollary is probably of little practical significance since the cost of operating power is usually small compared to other costs.

207. Stocks, T. von

Inquiry into the properties and strata of the ocean floor with the aid of a high-frequency sonic depth-finder. (Erkundungen uber art und schichtung des meeresbodens mit hilfe von hoch-frequenz-echoloten). NATURWISSENSCHAFTEN v. 24, p. 383-89, 1935. (In German)

208. Sugihara, T.T. and Brown, V.T.

RADIOACTIVE RARE EARTHS FROM FALLOUT FOR STUDY OF PARTICLE MOVEMENT IN THE OCEAN. Rept. no. TID-12394; RICC/195, 1960, 12p.

Samples of sea water were collected from the surface and at various depths at a number of locations in the Atlantic Ocean between 1956 and 1958. The samples were analyzed for Ce^{144} and Pm^{147}. Results are compared with data on Sr^{90} levels in the samples. The ratios Ce: Pm and CE:Sr are interpretable in relation to the same ratios for production in fission explosions. Applications of these ratios as indicators of the age of fission product mixtures in sea water are discussed. Data indicate that Pm and Ce are removed from surface sea water by becoming associated with sinking particles.

209. Sysoev, N.N.

An experiment of temperature registration of the surface layer of the sea by a deformative fluid thermograph. (Opyt registratsii temperatury poverkhnostnogo sloia moria deformatsionnym zhidkostnym termografom.) AKADEMIIA NAUK SSSR. INSTITUT OKEANOLOGII, TRUDY v. 5, p. 73-77, 1951.

Without going into a discussion of principles and technicalities of thermograph construction the author presents a description of a modified serial deformation (manometric) fluid thermograph ("Metpribor" make) installed in the machine room of the Soviet expeditionary ship "Vitiaz" as well as the results of its temperature registration of the surface layer of the sea during a 16 day voyage. The uninterrupted registration of the temperature curve (16 days) in presence of sharp oscillations of temperature (5-14°) checked every 3 hrs. by control measurements of the water samples showed a high precision level of recording and was evaluated at ± 0.15°. Figures, graphs and samples of temperature curves are appended.

210. Sysoiev, N.N.

Developments and future in the oceanographic instrument construction in the USSR. In PROCEEDINGS OF THE UNESCO SYMPOSIUM ON PHYSICAL OCEANOGRAPHY (TOKYO) p. 246-50, 1955.

The major advancements over the last ten years in the development of oceanographic instruments and techniques in the USSR consist of magnetostrictive echo recorders to determine ocean bottom topography and marine sediment stratigraphy; seismo-acoustic equipment along with special buoys for suspension of the hydrophones; bottom samples are obtained by hydrostatic pressure through pistons and vibration of the coring tubes; and the spectrohydronifelometer-transparency meter, a visual photometer combining a transparency meter and a nifelometer to determine degree of brightness and the index of weaking of white light in water. Substantial developments have been made measuring apparatus for the study of ocean currents; temperature measuring devices; salinity determination; ice flow drift measurement; wave height recorders; and deep water winches.

211. Sysoyev, N.N.

Oceanological investigations of Soviet scientists. VESTNIK AKADEMII NAUK n. 2, p. 21-32, 1960. (Trans. by U.S. Joint Publications Research Service, Trans. no. JPRS: 2787, 7 June 60, 28p.

The Soviet IGY oceanological research activities are summarized. The program included numerous measurements of temperature, depth, waves, velocities and directions of currents, determinations of the water's salinity, oxygen, and biogenic element content. Both standard and new oceanographic instruments were used. New apparatus included a self-contained electronic recording gear which made it possible to conduct investigations at extreme depths in the ocean, carry out regular measurements over prolonged periods, register previously unknown facts, and collect forms of animal life new to science.

212. Sysoyev, N.N.

The ship "Vitiaz" for oceanographic research.

AKADEMIIA NAUK SSSR. INSTITUTE OKEANOLOGII.

TRUDY (MOSCOW) n. 16, p. 3-23, 1959. (In Russian)

The vessel and its equipment is described in detail.

213. Terada, K.

Measurement of displacement by an electromagnetic device and its application to oceanographic measurements. In PROCEEDINGS OF THE UNESCO SYMPOSIUM ON PHYSICAL OCEANOGRAPHY (TOKYO) p. 21-25, 1955.

Due to the severe conditions encountered by oceanographic instruments, these instruments must be simple and adequately protected. Therefore electromagnetic transformers of easy mechanical construction and the simplest possible circuits are used. Output current as the difference of induced current is obtained by a Wheatstone bridge type circuit. This principle has been used for vibration, tension, pressure, and humidity measurements. Wave pressure measurements were made by the variation of mutual inductance due to mechanical displacement of the iron core against the other stationary core. Other instruments, based upon similar principles, are used for water level variation, wave pressure and wave height measurements.

214. Thiel, E., et al

Gravimetric determination of ocean tide, Weddell and Ross Seas, Antarctica. J. GEOPHYS. RES. v. 65, n. 2, p. 629-636, Feb 1960.

The use of the gravity meter for measurement of ocean tides is illustrated by studies on the floating ice shelves of Antarctica.

215. Thomas, C. W.

Sub-ice positioning in the Arctic basin.

NAVIGATION v. 6, n. 3, p. 190-194,

Autumn 1958.

The author has pointed out the advantage of drifting stations as scientific observation platforms and the application of information derived from them to sub-ice positioning. Many things have been taken into consideration, such as gravity, explosives, heat flow, sediments and satellites.

216. Thompson, J. C., Logan, R. K. and Nehrich, R. B.

INVESTIGATION OF WINDOW FRACTURE IN BATHYSCAPH. Navy Electronics Lab., San Diego, Calif. Research rept. for 19 Nov 60 - 19 Jan 61; NEL rept. no. 1030, 20 Mar 61, 12p.

ASTIA AD-260 290

An investigation was conducted to determine causes for failure of the acrylic window in the access tube of the bathyscaph TRIESTE and recommend corrective measures. The causes were determined to be severe local stressing caused by drilling of bolt holes; mounting stresses; augmenting of these factors by aging and thermal expansion coefficient differentials; and hydrostatic compression stresses during submersion. Design suggestions are made for reducing or eliminating these conditions.

217. Thompson, W. C.

XVIIth ASSEMBLY TO THE INTERNATIONAL COMMISSION FOR THE SCIENTIFIC EXPLORATION OF THE MEDITERRANEAN SEA. Office of Naval Research, London. Technical rept. no. ONRL-C-3-61, 19 Apr 61, 21p. ASTIA AD-258 765

No automatic release to Foreign Nationals. Descr ptors: *Scientific research, Mediterranean Sea, Radioactive waste disposal, Bathythermographs, Conferences,

217. (cont'd) Hydrographic surveying, Exploration, *Oceanographical data.

218. Tucker, D. G.

Some new possibilities in civil underwater echo-ranging. J. BRIT. INSTN. RADIO ENGRS. v. 20, n. 4, p. 299-308, 308-311, Apr 1960.

Eight projects currently in hand in the Electrical Engineering Dept., University of Birmingham, are leading to substantial improvements in echo-ranging techniques for fisheries operation and research, navigation, surveying and general oceanographical work. The projects are: electronic sector scanning; multiplicative reception; wide-band echo-ranging; interferometric echo-sounder; "bottom-lock" frequency-modulated echo-sounder; continuous wave echo systems; transfer of oscilloscope display to paper chart; and automatic electronic beam stabilization.

219. Tucker, M. J.

Electronic techniques in oceanography. J. BRIT. INSTN. RADIO ENGRS. v. 20, n. 12, p. 921-931, Dec 1960.

The design of electronic equipment for oceanographic use and of housings to withstand high pressures is briefly discussed. Underwater acoustics are considered in some detail and various applications such as echo-ranging and detection, telemetering, etc., are described. A shipborne wave recorder is described, together with a F. M. pressure gauge which has a resolution of 1 part in 10^6 of full scale and is suitable for digital recording and analysis.

220. Tucker, M. J. and Stubbs, A. R.

Narrow-beam echo-ranger for fishery and geological investigations. BRIT. J. APPL. PHYS. v. 12, n. 3, p. 103-110, Mar 1961.

A description is given of a 36 kc/s underwater acoustic echo-ranger, designed for fish detection but also useful for marine geological investigations.

221. Tucker, D. G. and Welsby, V. G.

Electronic sector-scanning asdic: an improved fish-locator and navigational instrument.

NATURE (LONDON) v. 185, n. 4709, p. 277-279, 30 Jan 1960.

A brief description of the asdic is given. It is suggested that applications will include: detection and location of fish; identification of fish by their shoaling habits, echo-strength and shape, etc.; research in fisheries work, e.g. the study of the structure and overall movements of fish shoals, and perhaps of individual fish; navigation; and hydrographic surveying. A more detailed description of the equipment has been published in J. BRIT. INSTN. RADIO ENGRS. v. 19, n. 11, p. 681 696, Nov 1959.

222. Tyler, J. E.

Observed and computed path radiance in the underwater light field. JOURNAL OF MARINE RESEARCH (NEW HAVEN, CONN.) v. 18, n. 3, p. 157-167, 30 Nov 1960.

This paper presents experimental data on changes in underwater radiance in zenith and nadir directions as a function of depth for both overcast and clear sunny lighting conditions at the surface. The equation developed by Preisendorfer (1957) to describe path radiance along any path is then used to predict observed changes, and predicted results are compared with the observed data.

223. Tyler, J. E., Richardson, W. H. and Holmes, R. W.

Method for obtaining the optical properties of large bodies of water. J. GEOPHYS. RES. v. 64, n. 6, p. 667 673, June 1959.

The equipment used is described and a method for computing six optical properties from measurements of radiance distribution is given.

224. United Kingdom Atomic Energy Authority. Production Group, Windscale, Sellafield, England and United Kingdom Atomic Energy Authority, Engineering Group, Windscale, Cumb, England.
THE DETERMINATION OF THE TOTAL GAMMA-ACTIVITY OF SHORE SAND, SEA SILT, SEABED MUD, VEGETATION, SEA-WEED, FISH FLESH AND NATURAL WATERS.
PG rept. no. 242, 1961, 8p.

A method suitable for the determination of total gamma activity in area survey samples of shore sand, sea silt, seabed mud, vegetation, seaweed, fish flesh, and natural waters is described. The samples were converted into a suitable physical form for packing into one of two standard types of container. The total gamma activity of the sample source was then measured by a scintillation counter.

225. U.S. Joint Publications Research Service
SOVIET BIBLIOGRAPHY ON OCEANOGRAPHY.
J.P.R.S. 3438, Washington, 24 June 60, 142p.

Compiled from various Russian sources. Contains references on instrumentation.

226. U.S. Navy. Hydrographic Office
NAVY OCEANOGRAPHIC NEWSLETTER.
Washington, Sep 61.

A bi-monthly newsletter to provide the fleet with timely information on developments in oceanography.

227. U.S. Navy Hydrographic Office

OCEANOGRAPHIC INSTRUMENTATION.

FINAL REPORT OF THE COMMITTEE ON

INSTRUMENTATION. Rept. no. H.O. SP-41,

Sep 60.

This publication presents a comprehensive, although not exhaustive report on the present development of oceanographic and geophysical instrumentation. Conclusions concerning the adequacy, accuracy, and reliability of existing equipment and instrument systems and recommendations as to avenues of approach and methods of solution of instrument limitations are presented. Included are sections on sea water temperature, salinity, pressure (depth), currents, ocean waves, radiation, marine biology, bottom materials and strata, bathymetry, tides, gravity, geomagnetics, positioning, and winches and hoists.

228. University of California at Berkeley, Fluid Mechanics Lab.

FINAL REPORT ON WAVE INVESTIGATIONS.

Tech. rept. no. HE-116-165, 1945, 132p.

(Contract NObs 16290)

229. Van Dorn, W.G.

A low-frequency microbarograph. JOURNAL

OF GEOPHYSICAL RESEARCH v. 65, n. 11,

p. 3693-98, Nov 1960.

A sensitive band-pass microbarograph has been designed to assist in the interpretation of records of surface water waves of low frequency made at isolated Pacific island stations. The instrument employs a hydraulic resistance-capacitance filter network to attenuate high-frequency gusts and the atmospheric tide. Sensitivity can be adjusted to as little as 0.1 millibar full-scale, but the recorder normally operates at the much lower sensitivity of ± 5.0 mb at oceanic stations, with a resolution of ± 0.05 mb.

230. Van Dorn, W.G.

New long-period wave recorder. GEOPHYSICAL RESEARCH v. 65, n. 3, p. 1007-12, Mar 1960.

A recorder was designed for the study of low-amplitude surface waves of ocean in the period spectrum intermediate between swell and tides. The recorder has a limiting resolution in pass band of about 0.035 cm of water, which is substantially lower than lowest ambient background found at small island stations in the mid-ocean.

231. Vine, A.G.

Some trends in oceanographic instrumentation. In PROCEEDINGS OF THE UNESCO SYMPOSIUM ON PHYSICAL OCEANOGRAPHY (TOKYO) p. 49-52, 1955.

Presents the techniques and equipment for very accurate echo sounders capable of detecting small dips and elevations on the ocean bottom to depths of 10,000 meters. A conductivity bridge which can be used for salinity determination both aboard ship and in the laboratory is briefly described. Use of a parachute for current measurements to a depth of 700 meters, anchored buoys, telemetering systems and research vessels are also described.

232. Visintin, B. and Monteriolo, S.

The spectrophotometric determination of monomeric silica and its low molecular weight polymers in natural waters. Note I. Observations on the silicomolybdic complex method. (Sulla determinazione spettrofotometrico della silice monomera e dei suoi polimeri nelle acque naturali. Nota I. Osservazione sul metodo del complesso silico-molibdico.)

232. (cont'd) REND. IST. SUPER. SANITA v. 22, n. 8-9, p. 773-786, 1959.

The technique of Weitz and Alexander was used to determine monosilicic acid in the waters of Fabio's spring in Lacco Ameno, Ischia, Italy. Experimental variables of the method were studied, resulting in some modifications. The following procedure is recommended: A 50 cm^3 sample is treated with 1 cm^3 HCl and 2 cm^3 molybdate reagent. After 3 minutes 1.5 cm^3 oxalic acid solution is added. Photometric reading at 4000 A is made against distilled water after standing 2-4 minutes, not longer. Color development is maximum at 3 min. and begins to fade after 5 min. Tests made at this spring showed the dissolved silica to be entirely monomeric.

233. Vodonepronitsayemyy snaryad. (A waterproof shell.) NAUKA I ZHIZN v. 12, p. 69, 1958.

The engineers and constructors of the Leningrad Planning Institute "Giprorybflot" constructed a bathysphere, in which scientists can be lowered deep into the sea to study the life of the submarine world.

234. Weigle, F.G. and Thorp, W.H. C

(Title Possibly Classified) Navy Underwater Sound Lab., Fort Trumbull, New London, Conn.

USL Technical memo. no. 913-09-61, 27 Feb 61.

ASTIA AD-322 631. CONFIDENTIAL REPORT

235. Weiss, H.V., Lai, M.G. and Gillespie, A.R.

THE COCRYSTALLIZATION OF ULTRAMICRO QUANTITIES OF VARIOUS ELEMENTS WITH ALPHA-NITROSO-BETA-NAPHTHOL DETERMINATION OF URANIUM IN SEAWATER. Rept. no. USNRDL-TR-496, 21 Dec 60, 22p.

The cocrystallization of ultramicro quantities of various elements with alpha-nitroso-beta-naphthol was investigated. Radiotracer techniques were employed to measure the quantitative removal of these elements from aqueous solutions. Conditions were developed for the separation of Ce (III), Zn, Fe (III), Co (II), Zr and U (VI) by this

235. (cont'd) process. Pu (IV) and Ru (III) cocrystallized less completely while Na, Sr, and Sb (III) remained largely associated with the mother liquor. The process was applied in the determination of uranium in seawater. The measured amount was 3.1 ± 0.1 micrograms uranium/liter.

236. Werth, G.C.

DECOUPLING CONCEPTS AND PROJECT

COWBOY. University of Calif., Livermore.

Lawrence Radiation Lab. Rept. no. UCRL-6179-T,

11 Oct 60, 14p. (Contract W-7405-eng-48)

A brief resume of the principal results of the Cowboy program is presented. The purpose of the Cowboy program was to use high explosives to test the decoupling theory. The Cowboy experiment verifies the prediction that explosions in elastic cavities will yield very small seismic signals, compared to fully tamped shots. The surface measurements and the close-in measurements are consistent with one another and with the decoupling theory.

237. Weston, D.E.

A simple way of recording hydrophone depth.

DEEP-SEA RES. v. 7, n. 4, p. 291-293, 1961.

A simple means of recording hydrophone depth by connection into an echo-sounding system is described. The small corrections occasionally necessary and the practical working of the system are discussed.

238. Whittenbury, C.G., Huber, E.A. and Newell, G.S.

Instrument for measuring water waves. REVIEW

OF SCIENTIFIC INSTRUMENTS v. 30, n. 8,

p. 674-76, Aug 1959.

The variation of wave height is sensed by a probe whose capacitance is linearly dependent on wave height and controls the repetition rate of a blocking oscillator. The variation of repetition interval is converted into amplitude modulation at the recording site. The wide dynamic range (100:1) of the electronic portion of the instrument permits the measurement of ripples with the same accuracy whether they are on calm or rough water. The dynamic range of the instrument is limited by the characteristics

238. (cont'd) of the probe. The instrument requires no balancing, has a frequency range of 0 to 100 cps and a sensitivity which is adjustable. The maximum sensitivity used in the field was .0 v/cm water displacement and the noise level at this sensitivity corresponds to 0.032 mm rms water displacement.

239. Wiegel, R. L.
FIRST REPORT ON THE MARK V (THERMO-
PILE WAVE METER). University of California
at Berkeley, Fluid Mechanics Lab. Tech.
rept. no. HE-116-287, 1948, 7p.

240. Williams, J.
A SMALL BATTERY-OPERATED HYDROPHO-
TOMETER. Chesapeake Bay Inst., Johns
Hopkins Univ., Annapolis, Md. Technical
rept. no. 24; Reference no. 61-3, Mar 61, 18p.
(Contract Nonr-24820, Proj. NR 083-016)
ASTIA AD-256 005

Research is concerned with the design of a completely self-contained hydrophotometer for use in routine in situ transparency measurements. The advent of the cadmium sulfide photocell, with its high sensitivity and small size, prompted the design of such an instrument. The unit consists essentially of a light source and a photocell separated by a known distance. The water being measured is allowed to fill the space between the light source and the photocell, and the amount of light reaching the photocell through the water is compared to the amount of light which would reach the photocell in air. The transparency is read off the meter directly in percent transmission. The underwater unit is about a foot long, less than 3 in. in diameter and weighing less than 4 lb in air. It is suitable for use from a small skiff, since it is designed to be lowered by its electrical cable, or from the winch of a larger vessel by means of a ring placed on the end opposite the electrical cable.

241. Williams, J.
A SMALL PORTABLE SALINOMETER.
Chesapeake Bay Inst., Johns Hopkins Univ.,

241. (cont'd) Annapolis, Md. Technical rept. no. 23, Reference no. 083-016, Jan 61, 19p. (Contract Nonr-24820, Proj. NR 083-016) ASTIA AD-251 085

Salinity may be calculated from a known relationship involving the electrical conductivity and water temperature. A small portable instrument operating from flashlight batteries is described which measures these two parameters in situ and essentially performs the calculation to a direct readout accuracy of + or - 0.3% salinity. With the aid of calibration data this accuracy may be increased to + or - 0.05 % salinity.

242. Williams, J. A small portable unit for making in situ salinity and temperature measurements. PROC. INSTRUM. SOC. AMER. v. 15, n. 1, Paper 43-NY60, 1960, 6p.

A transistorized instrument for measuring water conductivity and temperature is described.

243. Willis, R.P. Some methods of obtaining large sea-water samples from depth. NEW ZEALAND JOURNAL OF SCIENCE v. 2, n. 3, p. 393-97, 1959.

244. Wilner, L.B. STUDIES OF THE PERFORMANCE OF ELECTRONIC COMPONENTS UNDER DEEP OCEAN PRESSURES. Lockheed Missiles and Space Company. Rept. no. LMSD-894807, Feb 61, 16p.

244. (cont'd) The present study, part of an overall program to develop up-to-date oceanographic instrumentation, is concerned with the design of components used in solid-state circuitry. Test equipment and procedures are described. Components tested include: resistors, capacitors, transformers, diodes, transistors and batteries. Several oscillator circuits were also tested. Test results are presented.

245. Wilson, B.W.

CHARACTERISTICS OF DEEP-SEA ANCHOR CABLES IN STRONG OCEAN CURRENTS.

Texas A. and M. College, College Station.

Technical rept. no. 204-3; Ref. no. 61-1T, Feb 61, 81p. (Contract Nonr-211902) ASTIA AD-259 379

This analysis examines the steady state configuration of a deep-sea mooring cable in realistic ocean currents in a nominal water depth of 12,000 ft. The earlier solutions of the problem of a cable in a uniform current are adapted to variable distributions of velocity by the artifice of considering the ocean as a series of laminae within each of which the current can be regarded as uniform. The calculation procedure is developed for stepwise numerical integrations, and computations were made for a wide range of sizes of steel-wire and nylon rope mooring lines under two conditions of severe ocean currents, involving 6 and 3 knot velocities at the surface. Influences of the current are taken to vanish at a depth below the surface of 1000 m (3280 ft.). Justifications for the choice of design currents are given. Results of the calculations are available in a series of figures and tables. Several examples of the use of the tables are given in solution of mooring problems.

246. Wilson, J.D., et al

A comparison of three methods of determining the concentration of uranium in sea water.

ANAL. CHIM. ACTA v. 23, p. 505-14, (AERE-R-3177), Dec 1960. (In English)

A stable isotopic dilution method and a fluorimetric method for the measurement of the concentration of uranium in sea water are described. In both methods the uranium is extracted from the sea water into chloroform using 8-hydroxyquinoline. U^{237} is used as a tracer in the fluorimetric method. The results obtained by these two methods and by a pulse polarographic method are compared, and give a mean value

246. (cont'd) of $3.3_3 \pm 0.08$ μg per 1 for the uranium content of samples of English Channel and Bay of Biscay water. The precision of the methods improves in the order fluorimetry, pulse polarography, isotopic dilution.

247. Wilson, W.D. and Taylor, D.D.
Sound velocity measurement in liquids.
ELECTRONICS v. 33, n. 7, p. 69-71,
Sep 1960.

An instrument is described which is capable of measuring directly the velocity of sound for conditions of temperature, pressure, and salinity found in the ocean.

248. Wolf, G.
On the time-lag in pressure-proof and compression-proof reversible thermometers of VEB Glaswerke Ilmenau and their usefulness for thermometric deep-sea measurements. (Uber die tragheit der druckgeschutzten und druckungeschutzten umkippthermometer des VEB Glaswerke Ilmenau sowie ihre brauchbarkeit zur thermometrischen tiefenmessung auf see.) FEINGERATETECHNIK v. 9, n. 6, p. 249-252, June 1960. (In German)

Calculations show that an exposure time of 400 sec is adequate for measurements to 0.01 °C.

249. Woodbridge, R.G., III and Woodbridge, R.C.
Application of ultra-violet lights to underwater research. NATURE v. 184, n. 4682, p. 259,
25 July 1959.

249. (cont'd) The use of ultra-violet lights by divers in underwater research, in addition to opening up a new technique of exploration, may be of considerable interest to marine biologists, geologists and archaeologists. The hand carried, completely self-contained lamps are described and the results are presented, among which is the ability to see objects at a distance eight times greater than by the use of natural light.

250. Woods, A.J.

A mean sea level investigation. DOCK HARB. AUTHOR.v. 41, n. 479, p. 164-167, Sep 1960.

An account is given of the methods used in the measurement of sea currents in the Straits of Dover.

251. Woods, A.J. and MacMillan, D.H.

A new development in current meters. DOCK & HARBOR AUTHORITY v. 40, n. 469, p. 205-208, Nov 1959.

A direct reading current meter made by Kelvin & Hughes (Marine) Ltd., is described, together with the results of trials carried out with the instrument. The meter may be used to give a full delineation of tidal movement.

252. Woods Hole Oceanographic Institution, Mass.

OCEANOGRAPHIC AND UNDERWATER ACOUSTICS RESEARCH. Status rept. for 1 Nov 60 - 30 Apr 61; Ref. no. 61-16, May 61, 25p. (Contracts Nonr-136700, Proj. NR261-102 and Nonr 212900, Proj. 261-104) ASTIA AD-259 392

Investigations were continued in a broad program of research in physical oceanography, submarine geophysics (including underwater sound), and submarine geology. Dr. Voorhise, using the temperature and pitometer current-shear measurements from

252. (cont'd) the thermistor chain, found an equatorial counter-current in the Atlantic similar to the Cromwell current of the Pacific. Miss Bunce, Mr. Parker, and others in an intensive bathymetric survey found the channel (minimum depth cir. 2000 fms.) through the Mid-Atlantic Ridge by which cold water passes from the western Atlantic basin into the eastern Atlantic, and Miss Bunce, and Mr. Crampin successfully measured the thickness of the continental crust, 23 km to a layer having a seismic velocity of about 7.6 km/sec, under the continental shelf south of Ireland. Analysis of acoustical, geophysical, geological, and bioacoustical data proceeded as rapidly as possible in competition with the sea-going program.

253. Woods Hole Oceanographic Institution, Mass.
OCEANOGRAPHIC AND UNDERWATER ACOUSTICS RESEARCH CONDUCTED DURING THE PERIOD 1 NOVEMBER 1959 - 30 APRIL 1960.
Ref. no. 60-43, Oct 60, 16p. (Contracts Nonr-136700 and Nonr-212900) ASTIA AD-250 301

Contents: (1) Active detection: Explosive echo ranging, Directional explosive echo ranging; (2) Oceanography: Thermistor chain and contouring temperature recorder, Sound velocity measurements, Current measurements in the Tongue of the Ocean; (3) Submarine geology and geophysics: Seismic reflection studies, Bottom reflection and reverberation studies; (4) Acoustic Instrumentation: Thermistor chain hydrophone, Upside down echo sounder, Deep telemetering hydrophone, A new spectrum analyzer, Oceanographic computer, Precision graphic recorder instrumentation.

254. Woods Hole Oceanographic Institution, Mass.
OCEANOGRAPHIC AND UNDERWATER ACOUSTICS RESEARCH CONDUCTED DURING THE PERIOD 1 MAY 1960 - 31 OCTOBER 1960.
Ref. no. 61-2, Jan 61, 22p. (Contracts Nonr-136700 and Nonr-212900) ASTIA AD-251 416

Contents: (1) Oceanography: Sound velocity measurements, Heat flow measurements at sea, Ocean bottom photographs, Thermistor chain observations; (2) Submarine geology and geophysics: Seismic refraction studies in the western Mediterranean and on the continental shelf south of Ireland, Seismic reflection studies; (3) Acoustic Instrumentation: Oceanographic computer, Spectrum analyzer, Precision graphic

254. (cont'd) recorder, Continuous seismic profiler, Deep telemetering hydrophone, Telemetering buoys, Inverted echo sounder, South African seismic system, Improvement of echo sounding by pulse coincidence detection, Thermistor chain instrumentation.

255. Wooster, W.W. and Taft, B.A.

ON THE RELIABILITY OF FIELD MEASUREMENTS OF TEMPERATURE AND SALINITY IN THE OCEAN. Scripps Institution of Oceanography, Univ. of California, La Jolla. 1958, 15p. (Contract Nonr-221601, Proj. NR 083-005)

ASTIA AD-252 975

(Reprint from Jnl. of Marine Research v. 17, p. 552-566, 1958. Copies not supplied by ASTIA.) In order to evaluate the reliability of recent field measurements of temperature and salinity the behavior of certain pairs of reversing thermometers were followed through many reversals and the distribution of closely spaced measurements of temperature and salinity at intermediate depths were examined. The errors of measurement are comparable to those of the classical expeditions and are small with respect to sampling and other errors in the upper layers of the ocean. The effect of measurement errors on computed values of specific volume anomaly, of geopotential anomaly, and of geostnophic current speed was examined.

256. Yamagata, N.

Concentration of cesium-137 in the coastal waters of Japan. NATURE v. 184, Suppl. 23, p. 1813-14, 1959.

The concentration of cesium-137 in samples of coastal waters of Japan collected in 1959 was determined. Methods are described and data are tabulated.

257. Zahn, M.

A new water temperature gradient apparatus. (Eine neue wassertemperaturaturorgel.)

257. (cont'd) INTERNATL. REV. GES. HYDROBIOL.

v. 45, n. 3, p. 455-460, 1960.

A simple water temperature gradient apparatus is described and figured. In the apparatus, temperatures vary horizontally, and there is no vertical temperature gradient. It is suitable for experiments with larger animals, and with those that live on the bottom or on the surface.

258. Zorina, A.

A submarine laboratory. (Podvodnaya Laboratoriya.) NAUKA I ZHIZN v. 2, p. 17-18, 1959. (In Russian)

This article deals with the construction and equipment of and the tasks to be performed by the submarine "Severyanka", the "submarine laboratory". On Dec 14, 1958, the vessel put to sea for its shakedown trip. On board was an expedition of the All-Union Scientific Research Institute of Sea Fishing and Oceanography. All the water surrounding the hull was surveyed by highly sensitive hydroacoustic devices. With their the ichthyologists can determine the distribution and approximate outlines of fish schools. The submarine has three illuminators; 2 on starboard and port, and 1 which is directed upwards. The "Severyanka" has 2 sounding instruments with self-recording devices. One of them emits ultrasonic waves upwards, to the surface of the sea, the other down, to the sea bottom. The reflected signals immediately inform the scientists of the appearance of fish or other marine organisms. An electronic thermosalinometer determines the temperature and salt content of the water, and a special device for taking water permits its analysis and measuring for radioactivity. One of the main tasks of the submarine is the finding and tracking of shoals, a task, whose importance is demonstrated by the fact that the Soviet Union wants to increase her catches from 29 million centners in 1958 to 46 million centners in 1965. The team is also concerned with geologic, oceanologic and other research. During the cruise, scientists could observe mollusks, medusae, etc., through the illuminators at a distance of 10-20 m. Three times the boat went to the sea bottom. In 1958, the "Severyanka" will carry out several scientific expeditions into the fishing areas of various seas and oceans. For its 2nd expedition the ship went out to the Atlantic into the Soviet fishing areas.

259. Züllig. H.

A new closing flask with automatic bottom-release mechanism. (Eine neue schopfflasche mit automatischer boden-auslosevorrichtung).

259. (cont'd) SCHWEIZ. ZEITSCHR. HYDROL. v. 2, n. 1,

p. 109-111, 1959.

An apparatus is described and figured, similar in design to the Friedinger bailing bottle. By means of an additional measuring rod, water tests may be made free from sediment immediately above the water bottom.

CATCH-WORD SUBJECT INDEX